WMS

Welding Management System

Instructions for operation

SW 2.91

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GF WELDING S.p.A.
Strada del Portone, 18/24 – 10137 – TORINO (Italia)

Tel.: 011-3033.278 (Italy Sales dept.)
011-3033.270-279 (Foreign Sales dept.)

Tel.: 011-3033.277 (Italy Service)
011-3033.274 (Foreign Service)

Fax: 011-3092046
e-mail: mail@gf-welding.it
web: www.gf-welding.it

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1. CHARACTERISTICS AND INSTALLATION

1.1 Characteristics

1.1.1 Compatibility

The WMS software is compatible with the operative systems Windows 3.11, Windows 95, Windows98, Windows2000, Windows NT4.

The hardware platform recommended is the minimum for the operative system Windows 95.

Requirements

These instructions for operation are only valid if accompanied by:

- MS Windows™ Manuals
- Introductions for operation for Weld 332 or Weld 334
- Welding Control firmware Weld 332 Rel.4.42 or above
- Welding Control firmware Weld 334m Rel.1.07 or above
- One of the following network cards with manual:
  WMSNet Network:
  HBM 304 card with firmware 6.01 or above
  F314 card with firmware 1.0 or above
  Profibus FMS network:
  Siemens CP 5412 (A1) card
  Softing Profiboard card
  Ethernet Tcp/Ip network:
  Commercial 10BaseT compatible card

Warning! *The Fase and Profibus FMS network cards are only for BUS ISA*

Knowledge of welding techniques and of working with a PC in MS-Windows™ environment are required for operation.

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Working on screen

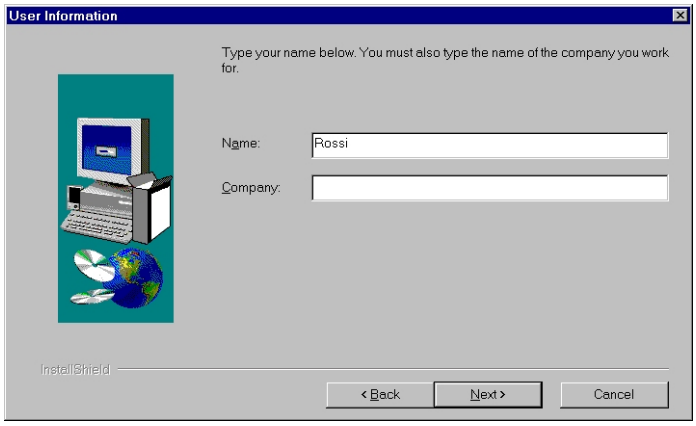
To operate in the Windows environment, please see the Microsoft Windows user manual, which is provided with each licence.

1.2 Installation

The installation procedure must be performed by personnel competent to use the Windows operative system.
Installation of the programme is fully automatic but during installation the system is configured on the basis of the communications network used, and thus it is necessary to know what fieldbus to select (see point 8 of paragraph 1.2.1).

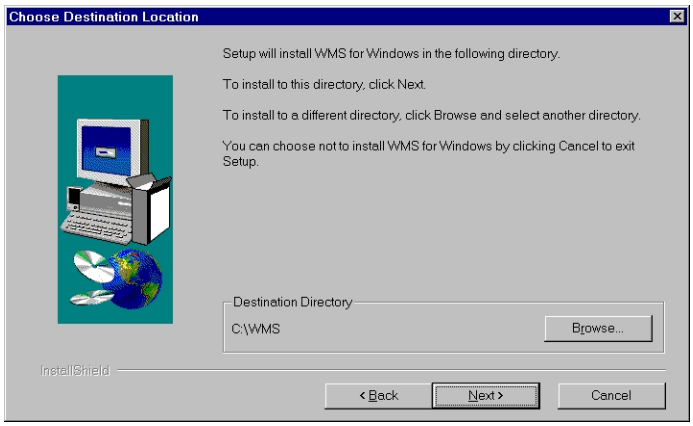
1.2.1 Installation of WMS Software

1) Insert the disk with the WMS Software in the corresponding drive (in this case in Drive A).
2) Open the Windows™ Main Menu (Explorer or Resource Manager) and access the floppy disk driver, identify the file SETUP.EXE on the disk, select it and then confirm with "OPEN".
3) The WMS installation menu now loads and a note about copyright appears.
4) To continue installation click on "**Yes**".
5) You will be asked to type in the name of the company to which the software is registered.



Type in the name and confirm with "**Next**".

6) The next step comprises defining the sub- directory for the WMS Software. You should normally choose the proposed directory: "**WMS**".

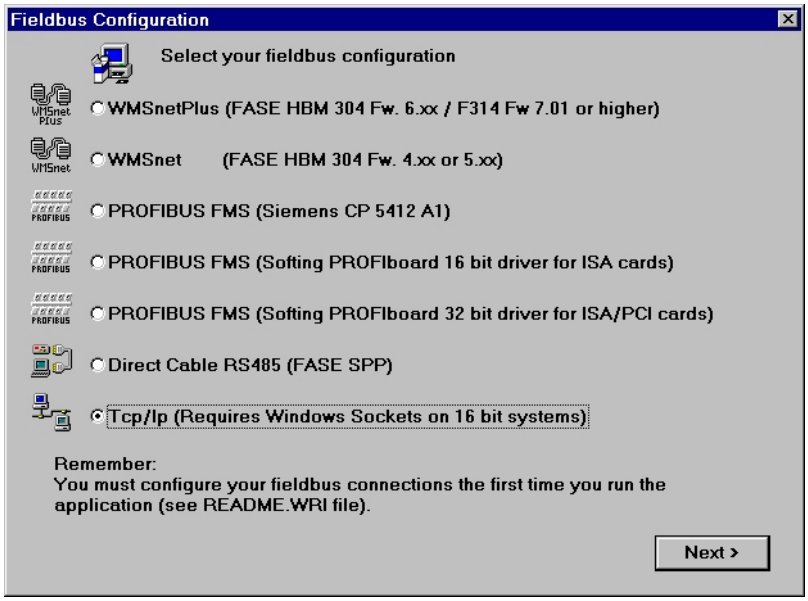

Choose Destination Location
Setup will install WMS for Windows in the following directory.
To install to this directory, click Next.
To install to a different directory, click Browse and select another directory.
You can choose not to install WMS for Windows by clicking Cancel to exit Setup.
Destination Directory
C:\WMS
Browse...
InstallShield
< Back
Next >
Cancel

7) After the directory has been confirmed the programmes will be transferred from the floppy disk onto the hard disk.

8) The next window asks you to select the language.

Select the language desired and confirm with "**Next**".
***NOTE**: the language can be changed even when the programme is running*

9) Fieldbus supported.


Fieldbus Configuration
Select your fieldbus configuration
WMSnetPlus (FASE HBM 304 Fw. 6.xx / F314 Fw 7.01 or higher)
WMSnet (FASE HBM 304 Fw. 4.xx or 5.xx)
PROFIBUS FMS (Siemens CP 5412 A1)
PROFIBUS FMS (Softing PROFIboard 16 bit driver for ISA cards)
PROFIBUS FMS (Softing PROFIboard 32 bit driver for ISA/PCI cards)
Direct Cable RS485 (FASE SPP)
Tcp/Ip (Requires Windows Sockets on 16 bit systems)
Remember:
You must configure your fieldbus connections the first time you run the application (see README.WRI file).
Next >

WMS is compatible with the following types of serial interface: Profibus-FMS, Ethernet Tcp/Ip, WMSNet and SPP (type (GF WELDING proprietary networks). To install the programme correctly you must select one of the fieldbuses that are available in the configuration window (see figure above).

The options available are:

1st option: WMSNETPLUS
If the network card is a HBM304 (GF WELDING) with 6.xx Firmware or if it is a F314 (GF WELDING) card.
This version allows 62 welding controls to be connected subdivided into two ports (A and B) of 31 devices each.
The driver supports two cards for a total of 164 devices.

2nd option: WMSNet

If the card is a HBM304 (GF WELDING) with 4.xx or 5.xx firmware (versions installed before 1998).
This driver supports 62 welding controls on two ports of 31 devices each.

3rd option: PROFIBUS-FMS (Siemens CP5412 A1)

If the interface card is a Siemens model CP5412 A1 (now obsolete, in use before 1998).
This driver supports 50 welding controls connected to one port.

4th option: PROFIBUS-FMS (Softing Profiboard)

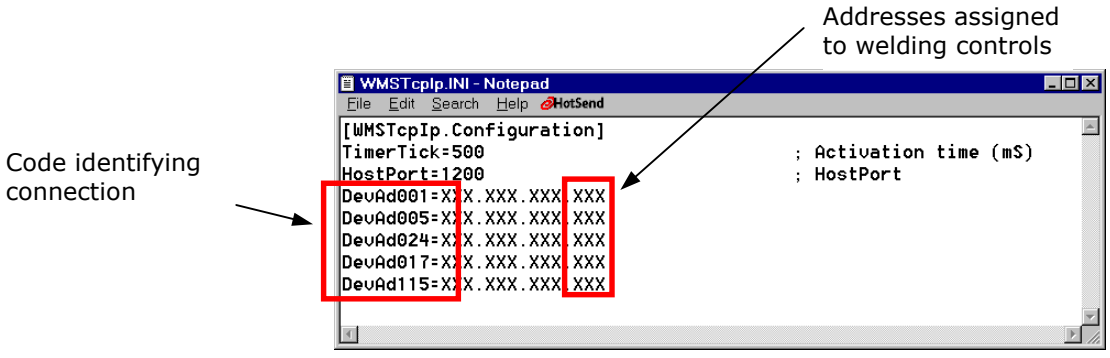
If the card is a PROFIBOARD by Softing (current), it supports 47 welding controls on a single port.

5th option: Direct Cable RS485 (GF WELDING SPP)

If you want to use the programme as a connection to a single welding control (not networked), via the serial port of the PC.
This option does not require an interface card and allows connection to one device, using the GF WELDING cod.32102117 adaptor cable, via the connector of the programming terminal HHT4300.
By default the driver uses the computer's serial port COM1. If this port is already being used by a device (mouse), the interface cable must be connected to the serial port COM2; in this case edit file SPP.ini located in the WMS folder, by replacing the value 1 with the value 2 at item CommPort. Save and load WMS.

6th option: Ethernet Tcp/Ip

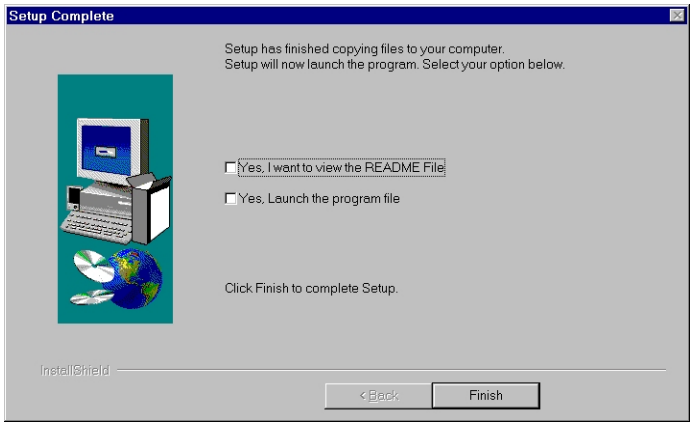
This option requires an Ethernet type 10BaseT interface card, plus ths communication protocol Tcp/Ip, to be installed on the PC.
Once installation of WMS is completed the addresses of all devices connected to the network must be recorded manually, modifying the file WMSTcpIp.ini respecting the syntax of the line indicated as default (see example below).



The code identifying the connection *DevAdXXX* is arbitrary.
The driver can support 127 welding controls.
To configure the addresses to be assigned to the devices, consult the welding control programming manual.

Select the driver desired and confirm by clicking on "**Next**"

10) Wait until SETUP displays the Installation Complete message.


Setup Complete
Setup has finished copying files to your computer.
Setup will now launch the program. Select your option below.
Yes, I want to view the README File
Yes, Launch the program file
Click Finish to complete Setup.
InstallShield
< Back
Finish

11) We recommend you close the Windows™ session and **restart the system** after installation is complete, so as to make the changes introduced during installation operative.

1.2.2 Configuration parameters

User parameters in the File WMSCONF.INI (Main. Configuration)

Cut Wind Move
This parameter enables the WMS screen and the ICONS to be moved. The parameter is thus set to 1.

Single Task
Setting the parameter to 1 blocks access to other programmes. Thus with WMS open it is impossible to run other programmes.

Exit Windows
With Parameter 1 you leave Windows automatically when you close WMS.

Network Parameter
This parameter manages periodic activation of the WMS network manager.

Activation Time

Standard	100 msec
Minimum	50 msec
Maximum	1000 msec

Normally the user does not need to act on this parameter.

IO Time Out
This parameter controls the transfer time for the data packages.

Standard	30 sec
Minimum	5 sec
Maximum	60 sec

The purpose of this parameter is to balance the "error time out" on the basis of the number of devices connected.

Date Time upgrade
This parameter manages the frequency with which date and time of the connected Weld 332 and Weld 334m devices are updated.

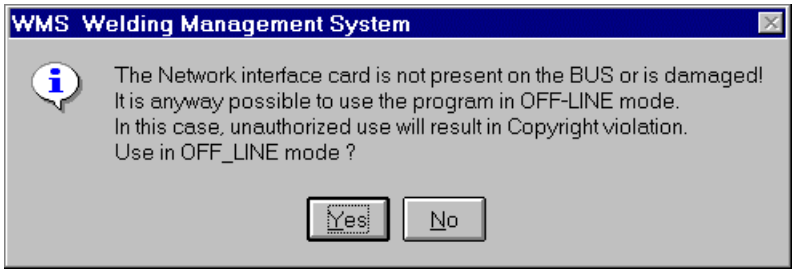
Standard	10 min
Minimum	1 min
Maximum	60 min

After installation, proceed with network configuration.

1.3 Starting the WMS programme

To start the WMS software click on the WMS symbol in the window "WMS for WINDOWS".
The programme starts automatically; you can drag the WMS.exe icon into the "Start" window (Windows 3.1) or drag the icon onto the desktop, creating a connection with the file (Windows 95/98).
After having started the WMS programme, the "**Main Menu** " is displayed.
The WMS programme can be set to eight different languages: Italian, German, French, English, Portuguese, Spanish, Flemish, Polish, Czech.

1.3.1 Warnings or errors on starting the programme


WMS Welding Management System
The Network interface card is not present on the BUS or is damaged!
It is anyway possible to use the program in OFF-LINE mode.
In this case, unauthorized use will result in Copyright violation.
Use in OFF_LINE mode ?
Yes
No

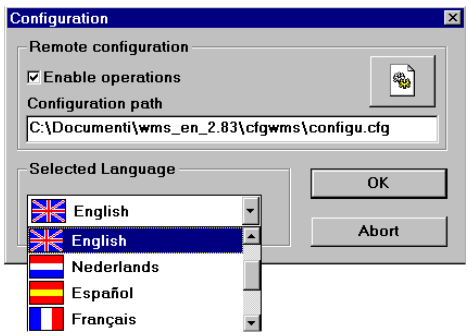
- This message may be due to loading the wrong driver: load WMS and open the network function to check the driver loaded.
  If the driver is correct, next check the settings for the addresses (see the users manual of the card installed).
- In case of a SPP connection, check that the COM1 port is free, otherwise use COM2 (see chapter 1.2, 5th option).

***NOTE**: WMS may be used in any case without interface card to consult the stored files of welding controls or to create/edit welding/stepper programmes and setup outside the network of welding controls.*

1.3.2 Language selection

To select the language, select "**Configuration**" on the drop-down menu "**WMS**":

Then select the flag of the language desired:

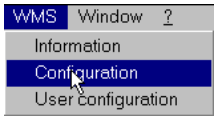


Once you have selected the language you must close and restart the programme.

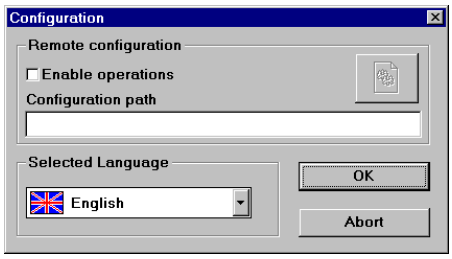
1.3.3 Enabling Remote Configuration

This allows you to use a preset configuration for the functions File Data and Acquire Data.
The remote configuration can only be defined through the Configurator programme (optional).

To enable remote configuration access the WMS programme menu and select "Configuration".



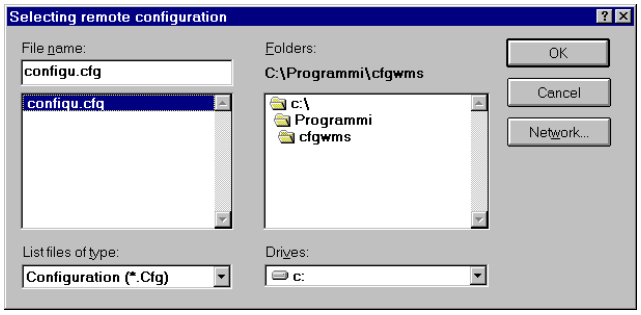
The configuration window will open



Enable the function

and access the network through

Locate the path in which the configuration file *.CFG you want to use has been saved and confirm with OK.



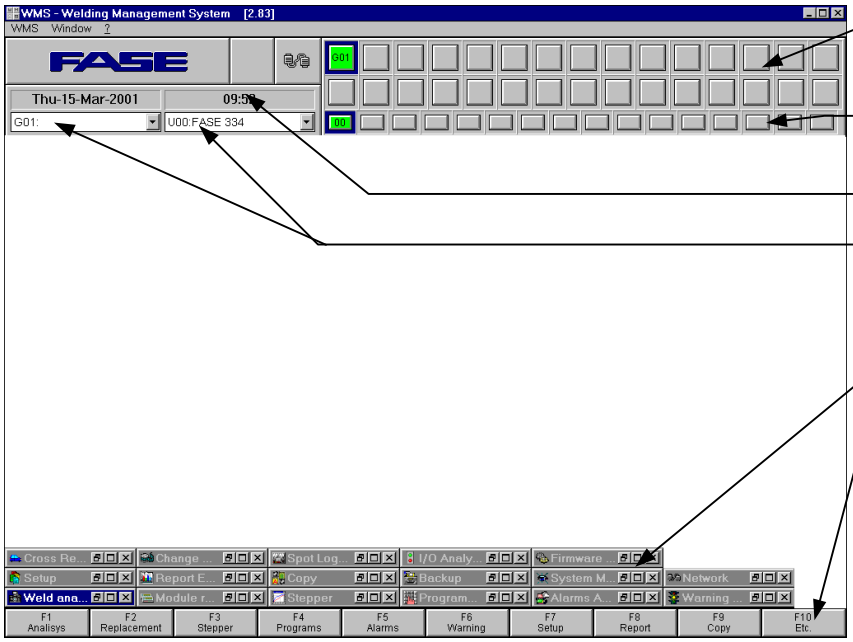
The path is loaded and is displayed in the configuration bar

By enabling remote configuration, the functions of File and Acquire Data use the path recorded in the file *.CFG and store data in the respective folders (see chapter 4.2 on Backup Data and chapter 4.3 on Data Acquisition).

***NOTE**: these functions must be enabled in the Setup menu.*

1.3.4 Main menu

The main menu displays icons and function keys to open the programme, in the lower part of the screen.



30 nodes that can be devices or groups of devices

Units that can be assigned to each group, up to a maximum of 16.

Date and time

Group and unit selected

Icons and function keys to open the menus

In the upper part of the screen there are 30 squares in two rows, representing the 30 groups available. Below them are 16 rectangles corresponding to the individual welding controls (units) where the devices for the selected group are displayed each time.

The groups and modules connected are marked with a colour-code, with meaning as follows:

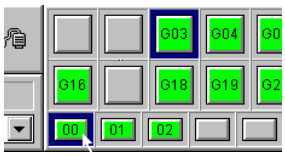
green	=	device ready
blue	=	Changes in the last 24 hours
yellow	=	diagnostic message (Alarm 1)
purple	=	device error message (Alarm 2)
red	=	serious alarm

When a field, whether square or rectangle, is not marked by any colour, it means that the group or device cannot be connected or that communication has been interrupted; you can check the error message by opening the function "Network" with F10 + F3 (see point 1.3.7.1).
The connection data for the groups and/or the welding controls connected are reported in the active fields.

Online editing

It is only possible to act on devices to create, view or edit programmes or parameters **Online,** that is the device on which you want to act must be selected.

In the figure, for example, the device selected is unit 00 of group G03.

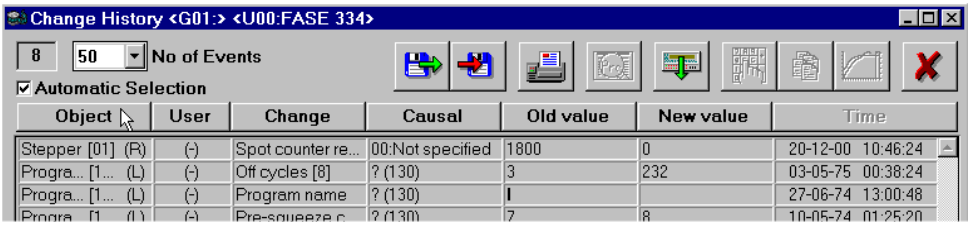


Offline editing

All welding programmes, steppers and setups can also be created **Offline**, that is without selecting them; in this case when you exit the operation you will be asked to save the name and destination of the programme (normally an archive directory).
You can thus work on programmes stored previously, view them, edit tham or save them with a new name and later load them on the welding controls.

1.3.5 Sorting elements

In the dialogue boxes where the list of elements to be consulted is displayed, you can sort elements by any of the columns, clicking on the button heading the desired column.



1.3.6 Symbols and Function Keys

1.3.6.1 General Symbols and Function Keys

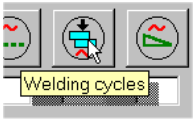
Symbol	*Function Key*	
	F1 Load_File	Load file from disk or hard disk
	F2 Save_File	Save file on disk or hard disk
	F8 Load_Dev	Load data from device to centralizer (WMS)
	F9 Save_Dev	Load data from centralizer (WMS) to device

When writing, either on disk or on the hard disk, the programme checks automatically that data with the same name or programme number do not already exist.

To overwrite these data confirm by clicking on the button **OK**; otherwise, click on **CANCEL**; the existing data will not be overwritten.

	F6 Print	Print data from the corresponding window
	F10 Exit	Close the corresponding window. A message will appear calling your attention if changes to the data have been made and have not yet been saved (on disk, hard disk or in the welding control).

If you confirm with **OK** you will lose the new data and exit the updated window. By clicking on **CANCEL** you will return to the current function.

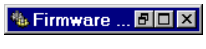


When the cursor of the mouse points to a button, after about one second a "screentip" window with the name of the symbol's function will appear.

1.3.6.2 Symbols and Function Keys of the main window

To perform selections into menus and enter data, the rules of MS Windows™ have to be followed (see the related manual). In particular, you cannot interact with grayed controls as they are disabled.
You can access the various programme functions clicking on the corresponding symbol or acting on the related function key.

***Note**: the symbol and key function list is subject to variations dependently on the installed options.*

Symbol	*Function Key*	
	F1 Analisys	Weld Analysis. This will display Online in the modes Constant Current and Monitor not only the welding current (theoretical and actual values) but also the characteristic values of the spot.
	F2 Replacement	Replacement of a welding control. Temporarily stores the upgraded data for the device on the PC and then loads it onto the new welding control.
	F3 Stepper	To Create/Edit/View Stepper programmes (current increase curves and if necessary pressure increase curves).
	F4 Programs	To Create/Edit/View welding programmes.
	F5 Alarms	To view alarms history.
	F6 Warning	This function monitors electrode wear.
	F7 Setup	To Create/Edit/View all configuration parameters of a welding control (SETUP).
	F8 Report	Welding and error statistics function over a specific timespan.
	F9 Copy	To copy and delete programmes and steppers.
	F10 Etc.	Changes the functions bar.
	F1 Backup	Stores all data relating to the welding control
	F2 Monitor	Displays all modules connected to the network
	F3 Network	Network configuration and diagnostics
	F4 Spot Reference	Spot reference
	F5 Changes	Consult changes in programming made to the device/ (History of changes).
	F6 Spotlog	Data acquisition
	F7 Analisys I/O	View I/O states
	F8 Firmware Upg.	Upgrades welding control firmware

1.3.7 Welding control configuration

With the icon

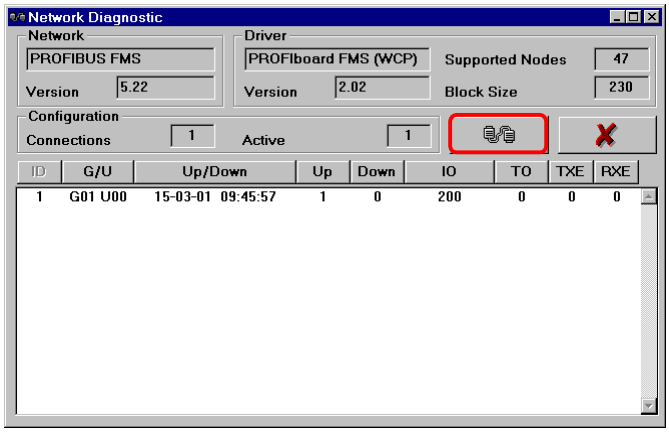
or the function keys

and

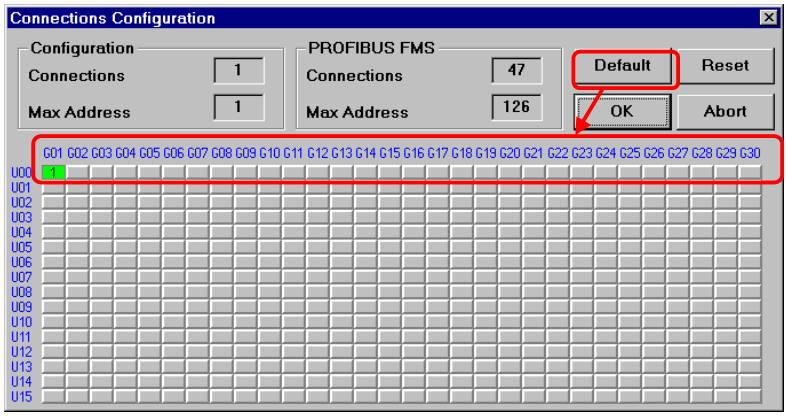
you can access Network Configuration.
Communication in network is only possible if the serial line connecting to the welding controls has been properly set up. For information on this point, please refer to the installation manual of the network card.
It is first necessary to configure the network (the first time you start the programme only the welding control with logical address 1 will be displayed).
In order for the devices to be detected by the programme, you must assign to each the logical address that will identify the node to which it is connected.
How you setup the physical addresses of the network of welding controls depends on the type of fieldbus used: WMSNet, Profibus FMS or Ethernet Tcp/Ip.

- When using the nework WMSNet, the address on the welding control is defined directly by the network connector (see installation manual for the WMSNet card).
- When using Profibus FMS the address on the welding control is defined through the 8-way microswitch present on the front.
- When using the network Ethernet Tcp/Ip you must assign the network address to all welding controls (consult the programming manual of the welding control) and subsequently record the address in the file WMSTCPIP.ini (see chapter 1.2, 6th option).

For further details on network addresses consult the technical manual of the welding control.
Then click on the WMS main menu on the symbol "**Network**". The submenu "**Network diagnostics**" will appear.

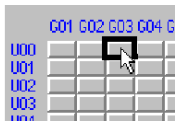


By clicking on the same symbol or with **F1** you can access the network structure.

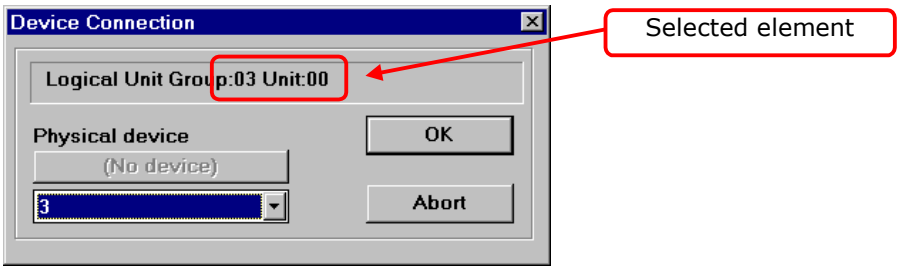


Here you can assign the individual devices to groups **(G01-G30)** and subgroups or units **(U00-U15)**.
By selecting "**Predefined**" you occupy unit 00 of each group with a welding control address, and that is from 1 to 30 in increasing order from left to right.
If you want to group together more than one welding control per group, proceed as follows: for the first network connection, preferably activate "**Reset**"; this enables you to reset any addresses occupied previously.

If, for example, you want to assign addresses 1 2 and 3 to Group 03, you must select the corresponding field of the matrix (in this case, for example, first select the box coreresponding to the position **G03, U00**);

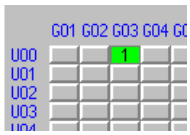


The following submenu will now be displayed:

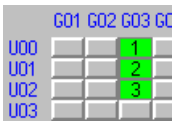


On the top line the element selected is displayed, at "**Physical device**" you can select the button "**No device**", enabling you to free this field if it were already assigned, or to assign an address to it.
Through the drop-down menu that opens by selecting ⬇ , all the addresses that are still free are displayed. Proceed to the address desired, "1", and assign it to the current unit "**G03,U00**".

At this point the corresponding field in the matrix will be coloured green and will display the address of the welding control.



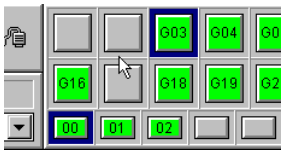
Proceed as above to assign the remaining two addresses "2" and "3" in the positions **"G03,U01"** and **"G03,U02".**



Occupation of the fields may be in sequence as you wish, assigning an appropriate address.
WARNING! *The address recorded in the network must correspond to that set on the welding control! For further information consult the installation manual of the network card.*

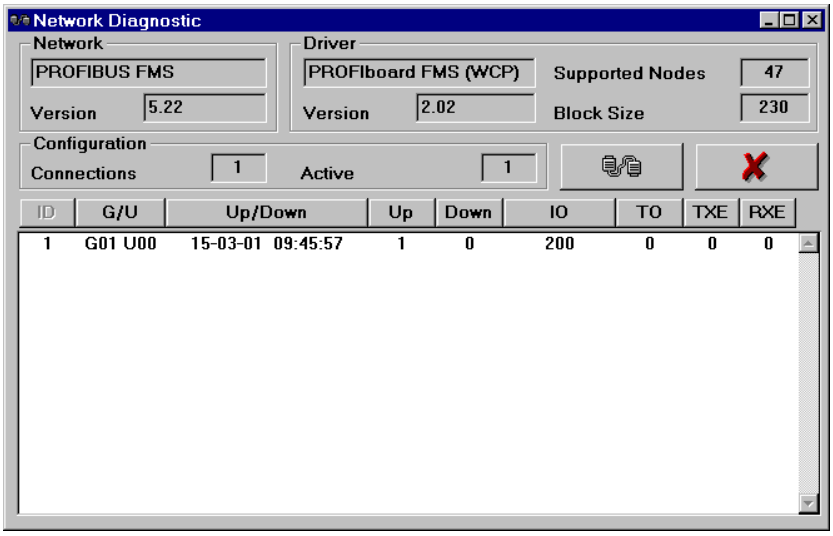
WARNING! *After having installed or modified the network, exit WMS and restart the programme; otherwise the new configuration will not be recognized.*

After restarting the WMS software all the welding controls will be recognized with the addresses assigned.
On the main screen, by selecting group 03 the three units assigned will be displayed in the lower boxes; as may be seen the values indicated are not the logical addresses but the active units in the group.



1.3.7.1 Network diagnostics

When configuration is completed and the programme has been restarted, you can open the network menu where all the devices connected are displayed, and you can check the assignment of the addresses to the units.
You can also diagnose all network interruptions for each node (Conn. and Disconn. columns) and the number of transfer errors that have occurred.

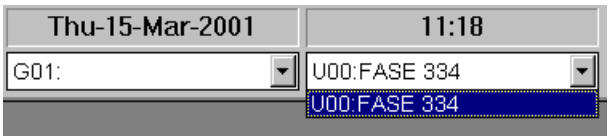


In the window you can identify:

ID	Physical address
G/U	Group / Unit
Up/Down	Date/time of connection to the node
Up	Number of times switched on
Down	Number of times switched off
IO	Number of I/O operations
TO	Transmission Time outs
TXE	TX error
RXE	RX error

1.3.8 Selecting a welding control

To select a welding control, for which you want to view or edit the data or in which new data must be inserted, select the corresponding group, then select the subgroup (third line) and the welding control desired.
In this case do not make the selection using the keyboard!
The selection may also be made with the drop-down menu beneath the word "**FASE**"; in this menu the left-hand window identifies the group, the right hand one the welding control:



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2. PROGRAMMING

2.1 Protecting changes (Password)

The commands that WMS can execute are subdivided into two classes:

- Non-protected commands, to view programmes or parameters set for the welding controls.
- Protected commands, to change the programmes or act on the welding controls.

The protected commands require (if protection is enabled) recognition of the operator, who is identified by a user number, user name and password (optional), to be entered in the Authentication window when saving any changes you have made.

Example of request for User Authentication

The grounds for the changes may also be recorded by selection from the drop-down menu. The grounds are recorded in the History of Changes (see paragraph 3.5).

***NOTE**: In the user configuration procedures the Description of Grounds box is not available.*

2.1.1 Users

The users are recognized (authenticated) by the system as User Number or User Name.
Each user is created by the System Administrator with his/her own User Number and User Name.
The System Administrator defines the authentication procedure by User Number / User name.
Each user is assigned to a specific level that defines his/her ability to execute certain commands.

The levels (starting from the lowest level) are:

Archivist	Only executes commands to save data present on the Welding control onto disks.
Operator	Executes commands of the level below and may also annul or change data relating to counters for the management of wear/ dressing.
Programmer	Executes all commands except the User Configuration command.
Administrator	Executes all commands. The System Administrator defines a personalized password for each user; this password is optional.

2.1.2 System Administrator

After WMS is installed the only existing user is the System Administrator who is recognized by default with User Number **0** or with User Name **ADMIN**.
The System Administrator is the only user with the privilege of creating other users and may also execute any command.
The ADMIN user is the only user at the Administrator level, and may not be renamed or cancelled.
The System Administrator may enable/dis-enable the protected command function (Enable Security).

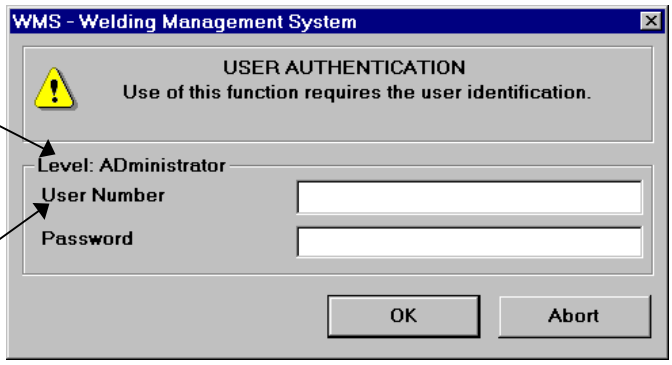
2.1.3 User creation

To create users you must first be recognized by WMS as the user ADMIN or as User Number **0**.
The user ADMIN initially has no password, however for security reasons it is advisable to insert one.
After installing WMS the procedure to create new users is as follows:

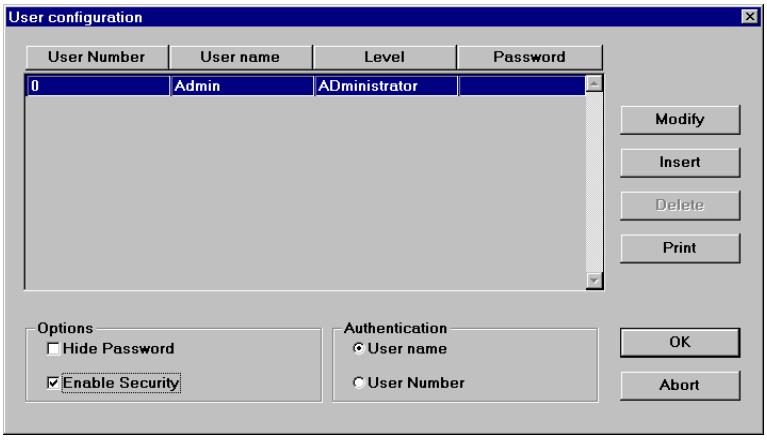
1. From the main menu click at the top left on the *WMS* menu.
2. Select the command User Configuration.
3. The User Authentication window will appear; insert the user data of the user you want to be authenticated to execute the protected command.

Minimum level that the user must possess to be authorized to execture the protected command

The system requires the predetermined type of user authentication: **User Number** or **User Name**

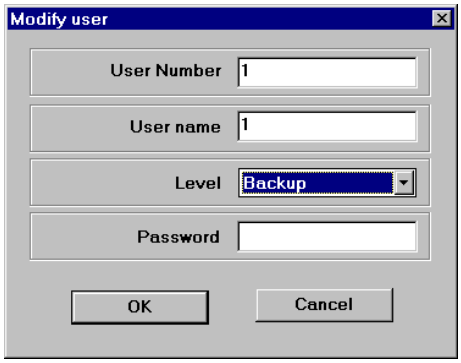


4. After having inserted the User Number **0** click on *OK*.
5. The User Configuration window will appear



6. Clicking on the button Insert the window Modify User will appear. This window asks you to insert a new user configured as follows:

- User Number: 1
- User Name: 1
- Level: Backup
- Password: None

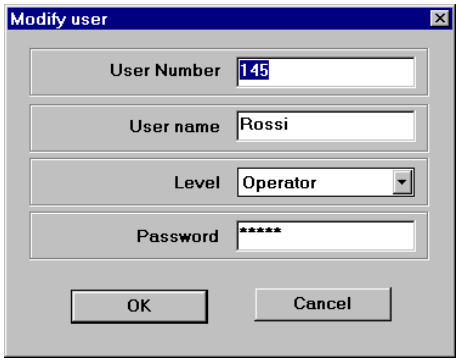


Modify User window at insertion of first user

7. As an example, we will modify the user configuration as follows:
- User Number: 145
- User Name: Rossi
- Level: Operator
- Password: Paolo

By clicking on the editable fields you can insert the new data.

8. After inserting the data click on the button OK to return to the User Configuration window



Modify User window containing the data of a new user

NOTE:

User Number	Must be between 0 and 999.
User Name	The maximum length is 16 characters; the system recognizes the User Name and the Password independently of upper/lower case letters.
Level	By browsing the drop-down menu you can select the user configuration level.
Password	The maximum length is 16 characters; the system recognizes the User Name and the Password independently of upper/lower case letters. When keying in the password only asterisks appear on the screen; to visualize the password disable the Hide Password box in the User Configuration window.

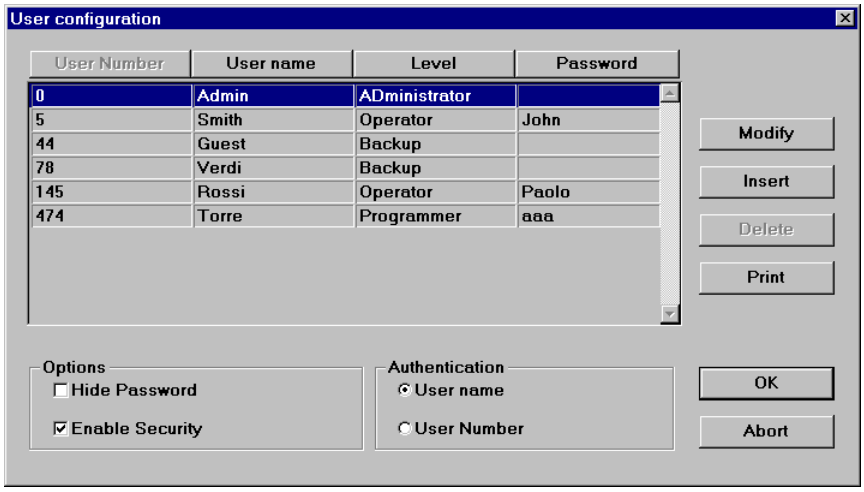
As an example other users have been inserted by repeating points 6-7-8.

9. Selecting the user ADMIN and then clicking on the button Modify you can insert the password for that user.

WARNING! Make a note of your password because, if you lose it, it will not be possible to create/modify the user configuration. In case of loss of the user ADMIN password, execute the following procedure:
1. Close the WMS application
2. In the WMS Installation Directory locate the file *Wms.pkf* (this file contains encrypted information relating to the last authentication of the user ADMIN)
3. Send the file *Wms.pkf* to GF WELDING customer service

GF WELDING will send back you the lost password.

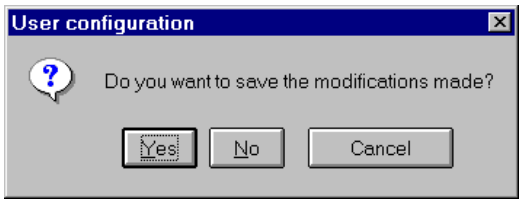
At the end, the User Configuration window will look like this.



10. Validate the new user configuration displayed by clicking on *OK.*

    To go back to the previous configuration click on Abort.

11. Another dialogue box will appear asking for confirmation that you want to save the User Configuration; confirm by clicking on Yes.



2.1.4 Other commands from the User Configuration window

Modify — By selecting a user and then clicking on the button *Modify* you can change the data in the same way that they were inserted (see paragraph 2.1.3)

Delete — By selecting a user and clicking on the button Delete you can remove that user.

Print — By clicking on the button Print the data contained in the window will be printed. To print the password you should deselect the box Hide Password

Hide Password — Selecting the *Hide Password* function, asterisks will be displayed instead of the characters in the various user passwords. We recommend that the System Administrator always leave this option selected when editing the User Configuration window in the presence of strangers.

Enable Security — By selecting the box Enable Security the protection provided for by the Protected Commands is enabled. If the box is deselected the only protected command is User Configuration.

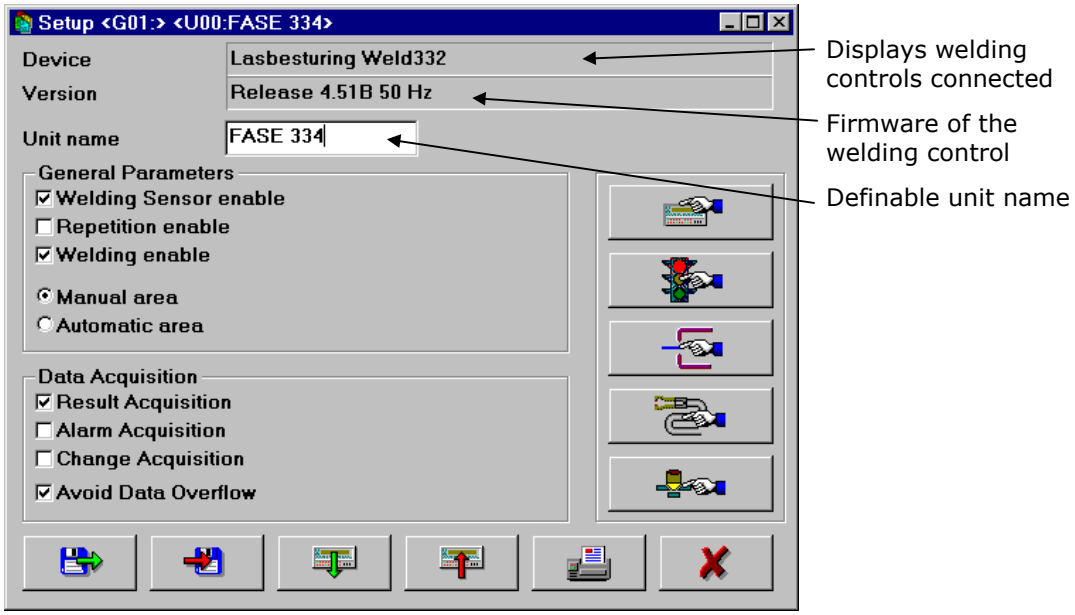
Authentication — Selecting the button User Number the user authentication dialogue box will ask the user to insert the User Number.

Selecting the button User Name the user authentication dialogue box will ask the user to insert the User Name (see figure at paragraph 2.1.3).

NOTE: *To test the protected command operation, OFF-LINE from the Welding controls (no device selected) you can edit a welding programme parameter and then save it on disk.*

2.2 *Setup*

With the function key F7 Setup or with the icon Setup you enter the configuration



2.2.1 General parameters

Unit name
To enter or change the name of the welding control, click on the field next to "Unit Name" and enter or change the name of the device.

Welding sensor enable
Activates or disactivates acquisition of current by the sensor.

Repetition enable
Sets the welding sequence to continuous cycle or disables it.

Welding enable
Enables or disables welding current.

Manual-Automatic area
This is used exclusively to differentiate the devices displayed in the Warnings Table

2.2.2 Data acquisition

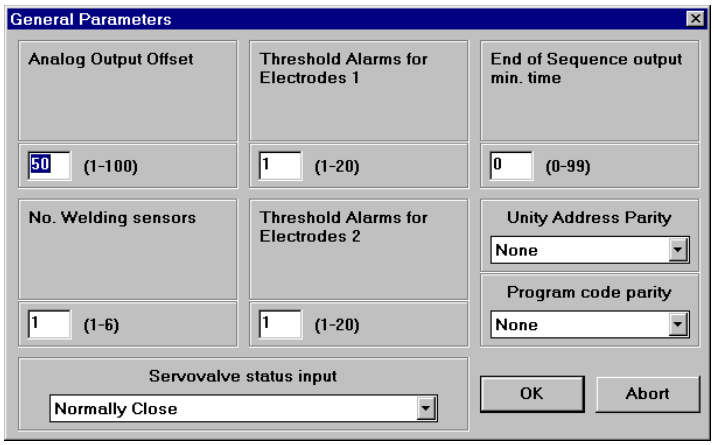
In the Data Acquisition menu (see Chapter 4.3) there are boxes for **Result Acquisition**, **Alarm Acquisition** and **Change Acquisition** which can be used to enable the following functions.

When Data Acquisition is enabled, you can activate the "**Avoid data overflow"** box.
The function of this box is to avoid loss of data when the memory of the device is full and WMS cannot *download* (for example if WMS is out of order or switched off or busy with other operations). Note that in this case the device will stop welding until data *download* occurs.
To avoid a possible production halt, allowing data loss to occur in this situation, deselect this box.

Warning!: *Changes only take effect after the new configuration is sent to the device.*

2.2.3 Parameter insertion functions

By pressing F3 Parameters or clicking on the general parameter introduction window will open



Analog Output Offset

The Offset parameter for the proportional servovalve. If assignment of max. electrode force is correct, this percentage is the % input of the max. electrode force.

Number of welding sensors

The welding control permits up to 6 current sensors to be connected in series. Indicate how many sensors are connected (normally 1) in order to ensure correct current reading.

Threshold alarms for electrode 1

Indicates the number of consecutive defective welds accepted on channel A. Error messages E005 and E006 will be issued when the number of consecutive defective welds is exceeded.

Threshold alarms for electrode 2

Indicates the number of consecutive defective welds accepted on channel B. Error messages E005 and E006 will be issued when the number of consecutive defective welds is exceeded.

Unity address parity

Enabling/ selecting the parity code of the welding control network address.

None = without

Even = with even parity

Odd = with odd parity

Programme code parity

Enabling/ selecting the parity code of the programme codes.

None = without

Even = with even parity

Odd = with odd parity

End of sequence output minimum time

If, having completed a welding programme, the Start signal (Channel A or Channel B) is not activated, this parameter indicates the minimum activation time (expressed in network cycles) of the output signal End of Sequence (FINESEQ). If the *Start* signal is activated during this time, the output signal End of Sequence will copy the *Start* status.

Servovalve Status Input

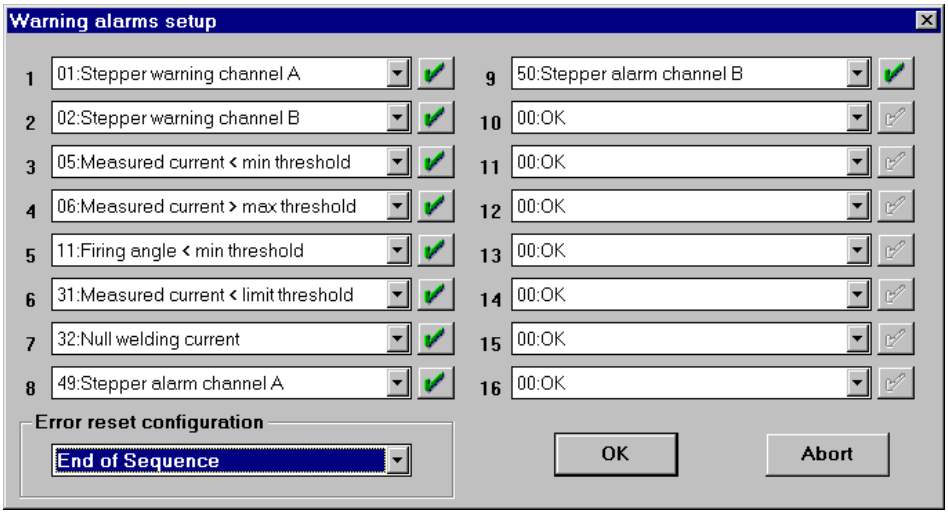
This enables the type of signal indicating the correct operation of the servovalve to be set, that is when the pressure required by the welding programme is reached:

High logic status = Normally closed

Low logic status = Normally open

2.2.4 Alarm programming

By pressing F5 Alarms or clicking on the error messages window will open:

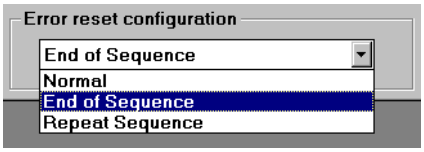


Here you may select up to 16 error messages with which to block progress of welding.

To select error messages click on one of the 16 lines and select the message from the drop down menu that appears.
Using the small button to the right (✔) you can activate the sequence block as soon as the error is verified. If the symbol is (**X**), the alarm will block the welding control; if the symbol is (✔) the alarm will not block the device.
The messages selected in this table are processed in the "Report" function.

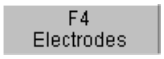
Alarm reset configuration

The error reset may be selected from three available modes: *Normal*, *End of Sequence* and *Repeat Sequence*.



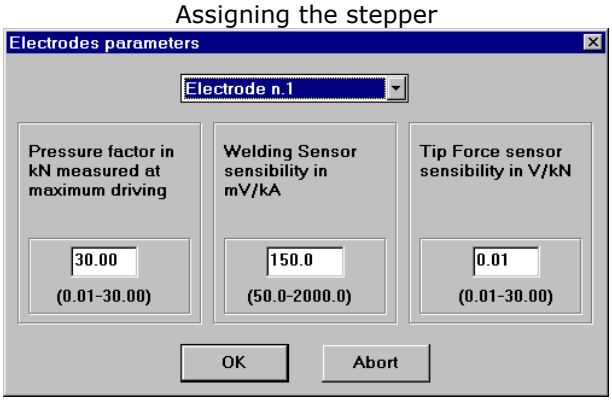
- **Normal:** the *Error Reset* command is normal.
- **End of Sequence:** the *Error Reset* command generates *End of Sequence*.
- **Repeat Sequence:** the *Error Reset* command with repetition of the sequence.

2.2.5 Electrode parameters

By pressing 

or clicking on you open the box for insertion of electrode parameters.

Assigning the stepper



Selecting Stepper/Electrode

Selects the Stepper/electrode for which the parameters are to be selected.

Maximum force factor in kN

This programmes the maximum electrode pressure. It is defined as the electrode force reached when the proportional valve outlet is at its maximum value (10V or 24mA).

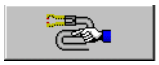
Welding sensor sensitivity in mV/KA

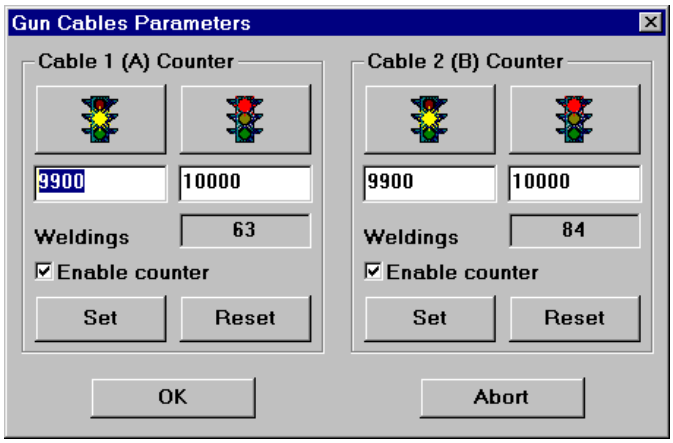
This adapts the current sensor.
The standard value is 150mV/kA.

Tip force sensor sensitivity in V/kN (optional)

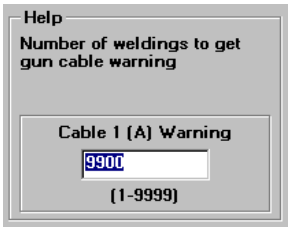
Parameter to be set with the conversion coefficient declared by the manufacturer of the force transducer (TF). The force transducers must generate an analog signal in voltage proportional to the force to be measured.

2.2.6 Cable wear (Optional)

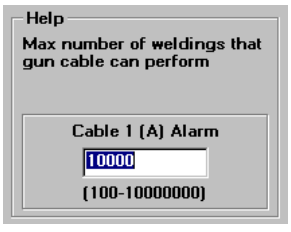
By pressing the key F7 Cables or clicking on  the Gun Cables Parameters programming menu will open (Cable wear).



Here for each cable you can programme the warning threshold value, enable or disable the counter (and thus cable wear management), view the updated count and lastly reset or set the counter. All the parameters contained in this window are described below.



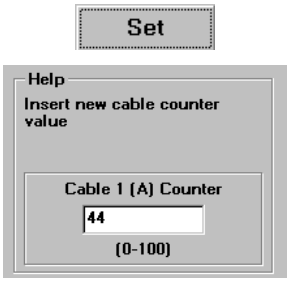
Warning threshold
By clicking on this button, you open the dialogue box where you can set the warning threshold value, that is the number of weldings at which the welding control will generate an alarm and the cable counter will be displayed in the Warnings Table. The window displays the minimum and maximum values permitted for this threshold and a short description of the parameter. It is also possible to key the value in directly in the field below the button without opening the dialogue box.



Alarm threshold
By clicking on this button you open the dialogue box where you can set the value of the alarm threshold or the number of welding at which the welding control generates an alarm and stops welding if the alarm is programmed as a "Blocking Alarm" The box displays the minimum and maximum values permitted for this threshold and a short description of the parameter. In this case too you can type the value directly into the field below the button without opening the dialogue box.

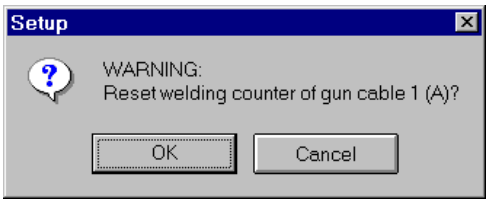
Weldings
This box displays the numer of weldings done by the cable. The value displayed is continually updated with new data in arrival from the welding control.

Enable counter
This box allows you to enable or disable the welding counter. If the counter is disabled, the welding control will not count the weldings done by the cable and in consequence will not generate any alarms or warnings about cable wear. Furthermore, the WMS Warnings Table will not display non-enabled cable counters.



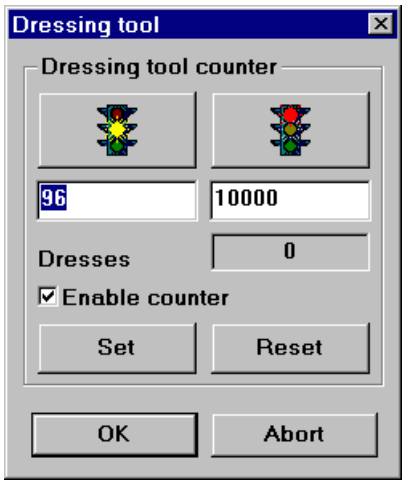
Set (the counter)
This button opens a dialogue box where you can set the counter to any value between 0 and the alarm threshold. The box contains a short description of the function and indicates the maximum permitted value. Note that it may sometimes happen that the maximum value indicated differs from that just set for the alarm threshold, since the maximum value reflects that currently known by the welding control. This occurs when you access this function after having changed the alarm threshold without first sending the new configuration to the device.

Reset (the counter)
This resets the counter value to zero. It may be used after having replaced the cable. Take great care over this function since, if the counter is reset without changing the cable, the number of weldings done will be lost. Before resetting the counter the operator is in any case asked to confirm it with this message:



2.2.7 Dressing tool wear

By selecting the button you can open the Dressing Tool Parameters programming menu.



Here you can programme the warning and alarm thresholds, enable or disable the dressing counter (and thus dressing tool wear management), view the updated count and reset or set the counter. All the parameters contained here are described below.

Warning threshold
By clicking on this button, you open the dialogue box where you can set the warning value as a percentage of the number of dresses set as the alarm threshold. When this threshold is reached the welding control will generate an alarm which in its turn will cause a line to be compiled in the Warnings Table containing the value of the dressing counter. The window displays the minimum and maximum values permitted for this threshold and a short description of the parameter. It is in any case possible to type the value directly into the field below the button without opening the dialogue box.

Alarm threshold
By clicking on this button you open the dialogue box where you can set the value of the alarm threshold, that is the number of dresses at which the welding control generates an alarm. The welding control also stops welding if the alarm is programmed as a "Blocking Alarm" The box displays the minimum and maximum values permitted for this threshold and a short description of the parameter. In this case too you can type the value directly into the field below the button without opening the dialogue box.

Dresses
This box shows the number of dresses done. The value displayed is continually updated with data arriving from the welding control.

Enable Counter
This box allows you to enable or disable the dressing counter. If the counter is disabled, the welding control will not count the dresses done by the tool and in consequence will not generate any alarms or warnings of dressing tool wear. Furthermore, the WMS Warnings Table does not display non-enabled counters.

Set (the counter)
This button opens a dialogue box where you can set the counter to any value between 0 and the alarm threshold. The box contains a short description of the function and indicates the maximum permitted value. Note that it may sometimes happen that the maximum value indicated differs from that just set for the alarm threshold, since the maximum value reflects that currently known by the welding control. This occurs when you access this function after having changed the alarm threshold without first sending the new configuration to the device.

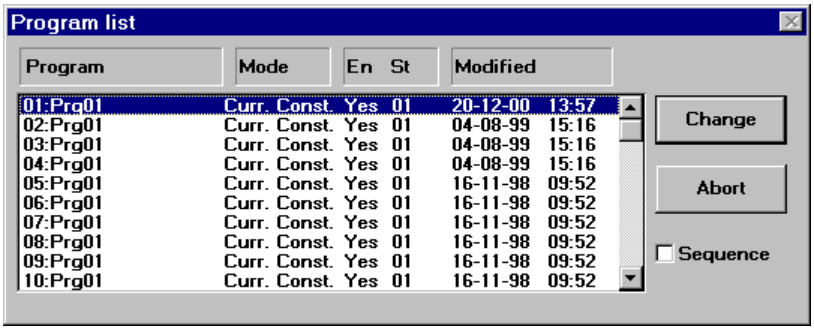
Reset (the counter)
This resets the counter value to zero. It may be used after having replaced the dressing tool. Take great care over this function since, if the counter is reset without changing the dressing tool, the number of dresses done will be lost. Before resetting the counter the operator is in any case asked to confirm it with this message:

2.3 *Create/Modify/View welding programmes*

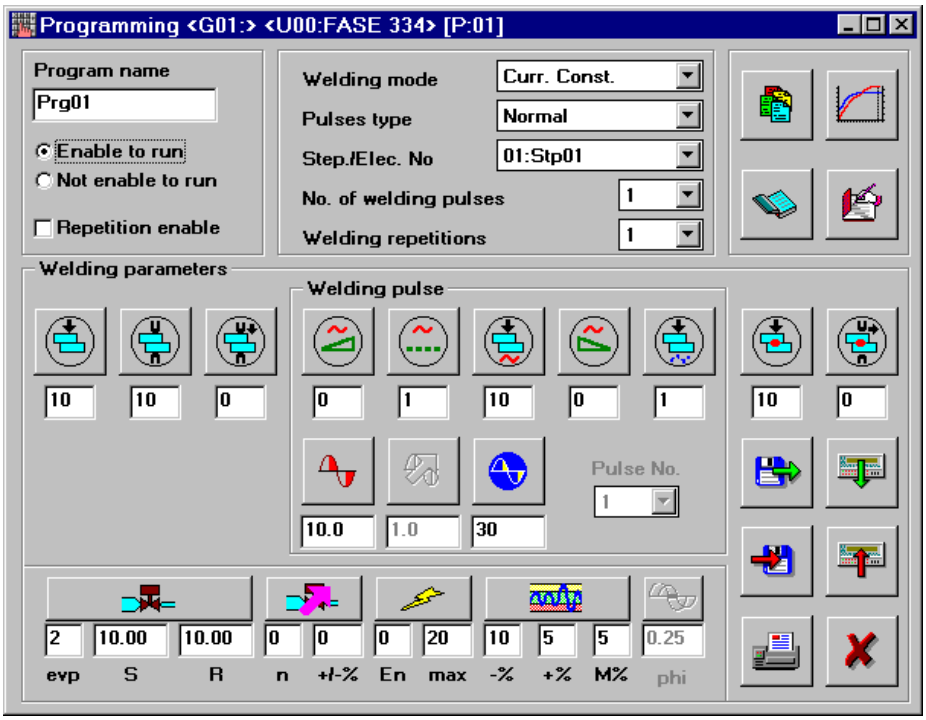
2.3.1 Editing

To insert the parameters, open a welding programme by pressing F4 Programs or clicking on the icon Program... .

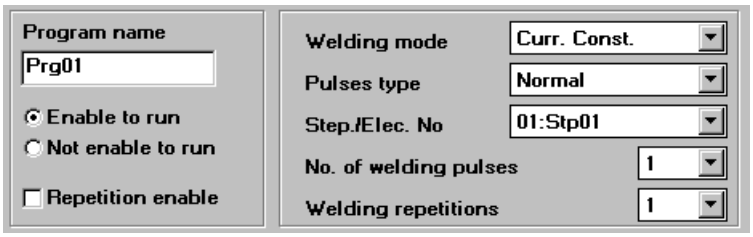
NOTE: *While editing to create/modify/view a programme you must first select the welding control device (Online Mode), otherwise a new programme menu will automatically open in Offline mode.*


Program list
Program
Mode
En St
Modified
01:Prg01 Curr. Const. Yes 01 20-12-00 13:57
02:Prg01 Curr. Const. Yes 01 04-08-99 15:16
03:Prg01 Curr. Const. Yes 01 04-08-99 15:16
04:Prg01 Curr. Const. Yes 01 04-08-99 15:16
05:Prg01 Curr. Const. Yes 01 16-11-98 09:52
06:Prg01 Curr. Const. Yes 01 16-11-98 09:52
07:Prg01 Curr. Const. Yes 01 16-11-98 09:52
08:Prg01 Curr. Const. Yes 01 16-11-98 09:52
09:Prg01 Curr. Const. Yes 01 16-11-98 09:52
10:Prg01 Curr. Const. Yes 01 16-11-98 09:52
Change
Abort
Sequence

Now select the programme to be edited or created; click on the number of the desired programme and confirm with "C**hange**" or "**New**".
You can now key in the new welding parameters or change them.



2.3.2 Configuration parameters



Programme name
Type in the name of the programme.

Enable to run/Not enable to run
The selected programme may be enabled or disabled. A disabled programme cannot run even if it contains valid data!

Repetition cycle
Sets to repeat spot /single spot

Welding mode
The operative modes available are:

Normal **Phase delay,** no measurement of current and no regulation

Monitor Welding current is monitored: control and evaluation of the welding current (control of threshold values), no regulation, only diagnostics

Curr.Const. Constant current regulation: control of the welding current and compensation for disturbances

Roll. N Continuous welding (with rollers) with phase delay (see **Normal**)

Roll. Mon. Continuous welding (with rollers) with welding current monitoring (see **Monitor**)

Roll. C.C. Continuous welding (with rollers) with current regulation (see **Curr.Const.**)

Pulse type
Available pulse types are "**Normal**" and "**Special**".
"**Normal**" Limited to 20 pulses, which however cannot be regulated singly.
"**Special**" Up to 4 pulses can be programmes separately.

Step./Elet.No.
This parameter assigns to the welding programme one of the 16 stepper programmes possible for each welding control. Insert a number between 1 and 16. Normally, all welding programmes operating on the same gun are assigned to the same stepper. To inhibit the stepper function assigned to this parameter set the value "**[None]**". In assigning the steppers check the gun parameter in **Setup.**

Number of pulses
Here the number of pulses that characterize the welding programme is set. When working with the *normal* type of pulse, this value may be between 1 and 20; with the *special* type of pulses, the value may be from 1 to 4. With the value '1' set as number of pulses there is no differentiation between the *normal* and *special* types of pulse.

Number of repetitions

After one of the following diagnostic messages appears:

- current below minimum threshold
- current below limit threshold
- no welding current

with this parameter you can repeat the welding spot up to 10 times.
Valid only for modes with current measurement: **Monitor**, **Curr.Const.** and **Roll. Mon**, **Roll. CC.**

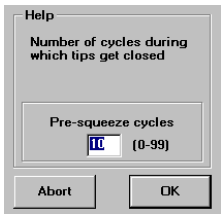
2.3.3 Welding parameters

The welding parameters are inserted in the lower part of the screen. The parameters can either be inserted directly in the boxes below the symbol indicating each, by double clicking on the box, or, after having activated the symbol, in the corresponding field. Clicking on the symbol will open another small window in which there is a short description of the function and the appropriate values to insert. The welding control will not accept inappropriate values (error message when you save).

***NOTE**: For correct selection of parameters you must know the application criteria for the various parameters (Squeeze time, Pressure, Pressure variation, etc.). The purpose of this manual is not to instruct on programming the welding control, thus descriptions are general in nature. Please see the welding control programming manual for a detailed description.*

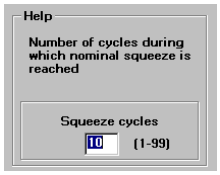
Squeeze time
This is the time, expressed in cycles, needed for the electrodes to close

Permitted field: 0 - 99 cycles



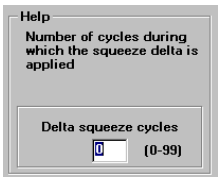
Pressure
This is the time, expressed in cycles, needed for the electrode pressure to be reached

Permitted field: 1 - 99 cycles



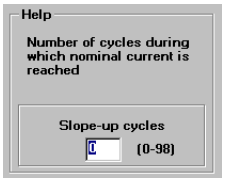
Pressure variation
This is the time, expressed in cycles, needed for the pressure variation to occur.

Permitted field: 0 - 99 cycles



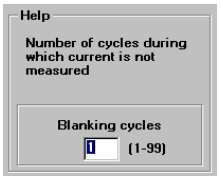
Slope up cycles
This is the time, expressed in cycles, needed for the welding current to rise from the minimum value to the programmed value.

Permitted field: 0 – 98 cycles



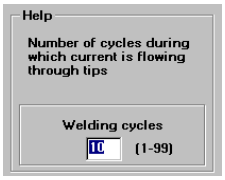
Blanking cycles
This is the time, expressed in cycles, of the welding pulse during which the current is not measured.

Permitted field: 0 - 99 cycles



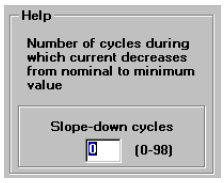
Welding cycles
This is the duration in cycles of the welding pulse

Permitted field: 0 - 99 cycles



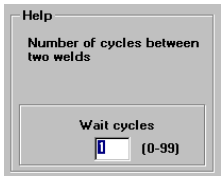
Slope down cycles
This is the time, expressed in cycles, during which the welding current decreases from the programmed value to the minimum value

Permitted field: 0 – 98 cycles



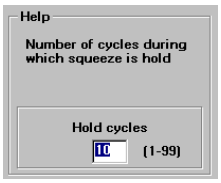
Wait cycles
This is the duration, expressed in cycles, of the current gap between welding pulses in pulse welding.

Permitted field: 0 - 99 cycles



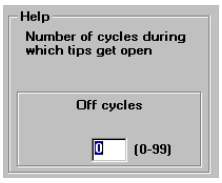
Hold cycles
This is the time, expressed in cycles, needed for electrode cooling after welding

Permitted field: 0 - 99 cycles



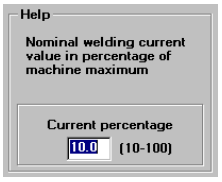
Electrode opening cycles
Only in the case of spots welded in series: the time in cycles during which electrodes remain open between individual spots

Permitted field: 0 - 99 cycles



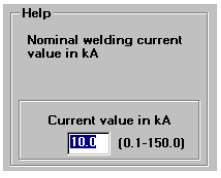
Welding current
The percentage of the max. current for the machine **in all NORMAL and MONITOR operative modes**

Permitted field: 10 - 100 %



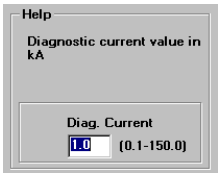
Welding current
Nominal value of the welding current, set **in kA in all CURR.CONST. operative modes**

Permitted field: 0.1 - 150.0 kA



Reference current
For diagnosis and control of the welding current, input in kA
only in MONITOR mode

Permitted field: 0.1 - 150.0 kA

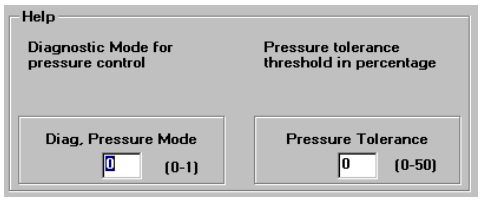


First half-cycle
Sets the smallest firing angle of the first half-cycle in electrical degrees

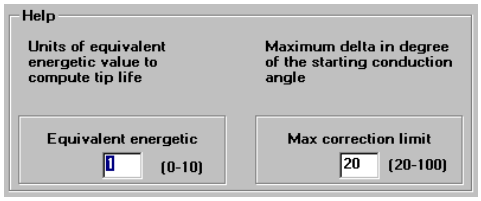
Permitted field: 30 - 135 electrical degrees.

Pressure parameters (See point 2.3.4)

Diagnostic mode for pressure control
Enabled = 0
Disabled = 1
Pressure tolerance
set in percentage value



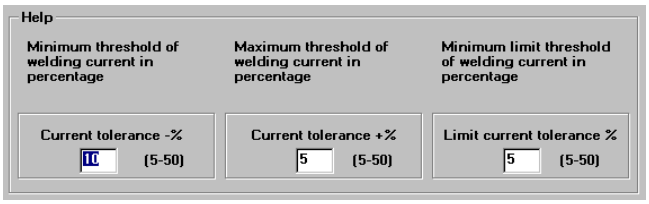
Equivalent energy value
to determine electrode wear (see welding control programming manual)

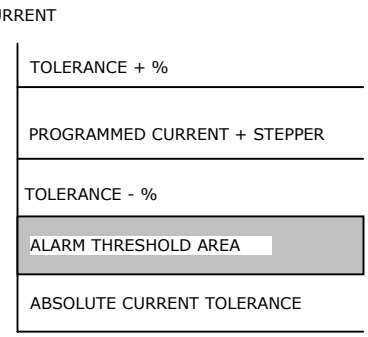


Current tolerance
Minimum threshold: this is the lower tolerance permitted for the real value of the current as a percentage of the nominal value.
Field: 0 - 50%

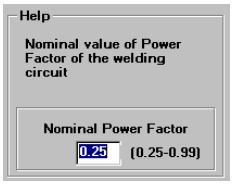
Maximum threshold: this is the upper tolerance permitted for the real value of the current as a percentage of the nominal value.
Field: 0 - 50%

Limit threshold: this is the lowest threshold permitted for the actual current as a percentage of the programmed current + increment step.
Field: 5 - 50%





Cos Phi
Nominal value of the power factor of the welding circuit, it must be set for NORMAL and MONITOR to use the regulation field.
Field: 0.25 - 0.99



For further information and details on the question of parameters, please see the instructions contained in the welding control programming manual.

Direct access to Configuration and the Stepper programmes

By clicking on this button you can edit the welding control configuration menu directly for view/modify operations

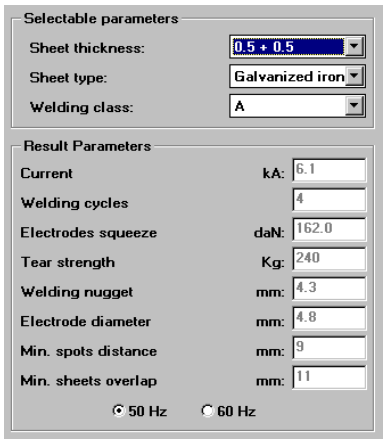
By clicking on this button you can edit the stepper used by the programme directly for view/modify operations

Reference Tables

This button gives access to a table with values typical of welding parameters for sheet metal and the most commonly used sheet thickness.

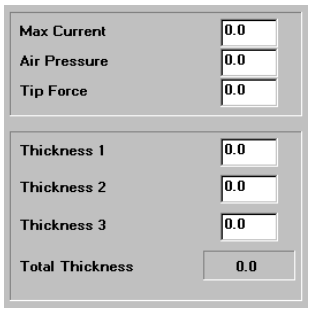
In the "**Selectable parameters**" field you can select the desired configuration of the sheet metal or a similar one.

The "**Result parameters**" field displays the standard values valid for this configuration and that, normally, must still be adapted for the machine; however, they may be taken as a base for the programme, by clicking on the Copy button

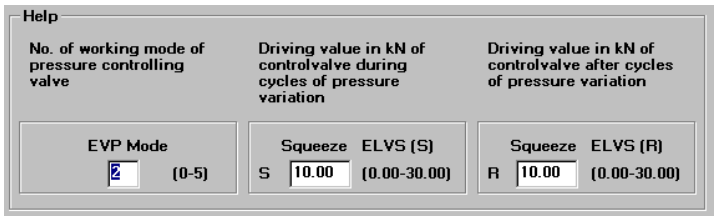


Notes

For you information you can note here the values used in the welding programme.
The total sheet thickness is calculated automatically.



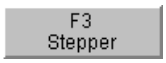
2.3.4 Pressure control

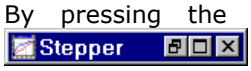


Pressure control mode (EVP).This enables you to select the electrode pressure control mode during pressure, welding and hold cycles. Pressure control modes differ on the basis of the presence of a further electrovalve or a proportional servovalve. In the case of two electrovalves, a normal one and an additional one, two different pressures may be given, which we will call S and R. In the case of a proportional servovalve, two pressure values, S and R, exerted by the electrodes, can be programmed. Note however that ELVS will always be the pressure that is exerted at the start of the requested pressure cycle. If you do not want to control the pressure, select Mode 0.

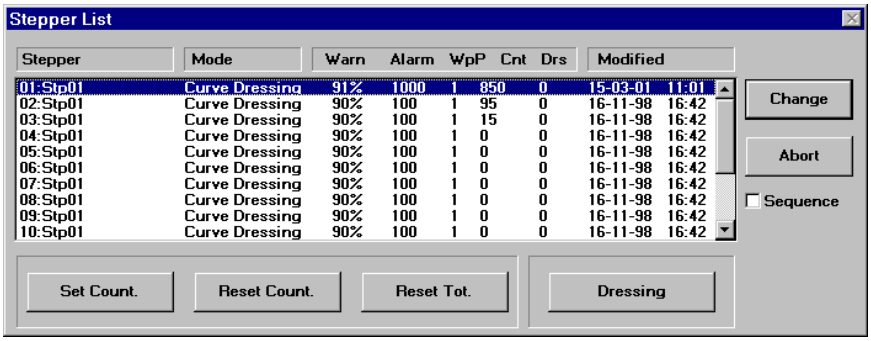
For further information or details about the parameters, please see the instructions contained in the welding control programming manual.

2.4 *Create/Change/View Stepper Programmes*

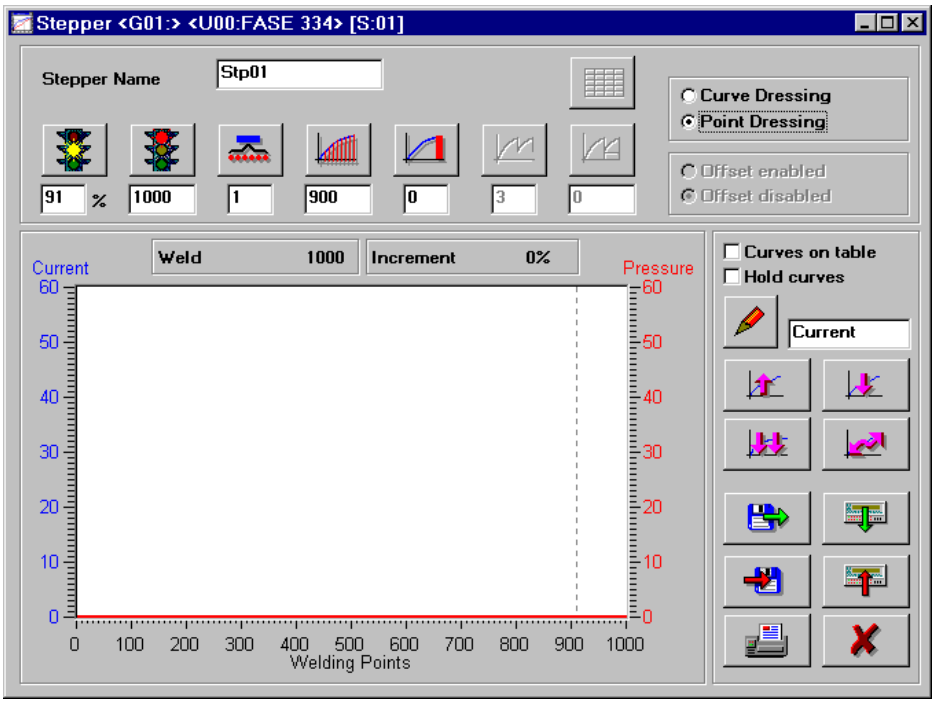
By pressing the function key 

or clicking on the icon 

the directory of the Stepper programmes opens.


Stepper List
Stepper
Mode
Warn
Alarm
WpP
Cnt
Drs
Modified
01:Stp01 Curve Dressing 91% 1000 1 850 0 15-03-01 11:01
02:Stp01 Curve Dressing 90% 100 1 95 0 16-11-98 16:42
03:Stp01 Curve Dressing 90% 100 1 15 0 16-11-98 16:42
04:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
05:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
06:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
07:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
08:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
09:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
10:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
Change
Abort
Sequence
Set Count.
Reset Count.
Reset Tot.
Dressing

After selecting the Stepper programme and clicking on **Change** or **Create** (if there are no stepper programmes or if you want to create a new one) the Stepper window will appear:



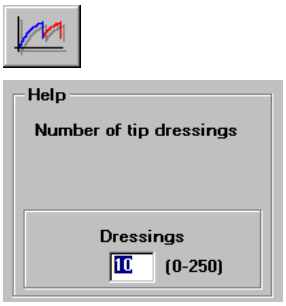
The stepper programmes can be created by managing the increment in different ways. They are divided by type into Curve Dressing and Spot Dressing, and you can create the curve step graphically or by using a table. The classic method is graphical; if you want to use a table please see paragraph 2.4.4.
The following paragraphs describe the two stepper modes, on the basis of the type of step that you want to use you proceed with programming the parameters as at paragraph 2.4.2.

2.4.1 Dressing modes

2.4.1.1 Stepper in the Curve Dressing mode

Stepper repeated for the number of times set by the user, requesting dressing each time.
When the set number of dressings has been completed, electrode change is requested.
The current stepper value is reset or forced to the Offset value after each dressing.
In the Curve Dressing mode, a second counter, known as the dressing counter, is used. The current value of the dressing counter is displayed in the Warnings Table. When the current value of the dressing counter is equal to the value set in the parameter Dressing Number, electrode change is requested.
The current value of the Dressing Counter is reset via the button Reset Selected Counters.
The Electrode Warning error messages (E001 and E002) are generated (when the Warning Threshold value of the parameter is reached) before each request to dress or change the electrodes.
The Electrode Alarm error messages (E049 and E050) are generated (when the Spots to Dress parameter is reached) at the same time as the request to dress or change the electrodes.
The Dressing Alarm error message (E066) is generated when the parameter Spots for Emergency is passed. The count of Spots for Emergency starts after reaching the number of spots set in the parameter Spots to Dress.
The Change Electrodes Alarm error message (E067) is generated when the parameter Spots for Emergency is passed. The count of Spots for Emergency starts after the number of spots set for the parameter Spots to Dress is reached on the occasion of a request to change the electrodes.

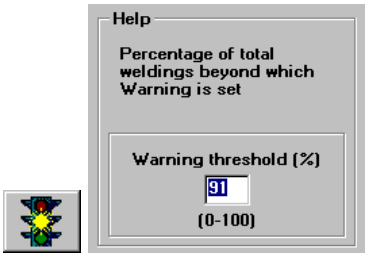
When *Curve Dressing is set,* the *Warning Threshold* is set as a percentage of the value of: [*Spots to Dress* (Number of Dressings + 1)]*



2.4.1.2 Stepper in the Spot Dressing mode

Stepper requests electrode dressing at set intervals.
The request to change electrodes comes on reaching the number of spots set in the parameter Alarm Threshold.
The current value of the stepper is reset to zero only after an electrode change.
The current value of the Dressing Counter produces no effect and is only displayed in the Warnings Table.
The Electrode Warning error messages (E001 and E002) are generated (when the Warning Threshold value of the parameter is reached) before each request to change the electrodes.
The Electrode Alarm error messages (E049 and E050) are generated (when the Alarm Threshold parameter is reached) at the same time as the request to change the electrodes.
The Dressing Alarm error message (E066) is generated when the parameter Spots for Emergency is passed. The count of Spots for Emergency starts after reaching the number of spots set in the Spots to Dress parameter.
The Change Electrodes Alarm error message (E067) is generated when the Spots for Emergency parameter is passed. The count of Spots for Emergency starts after the number of spots set for the Alarm Threshold parameter is reached.

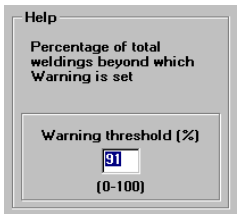
When Spot Dressing is set, the value of the Warning Threshold is set as a percentage of the Alarm Threshold value.



2.4.2 Stepper programme parameters

Warning Threshold
Number of weldings after which a Warning is set. On the diagram this point is marked with a dotted grey vertical line.

Permitted field: 0 -100%

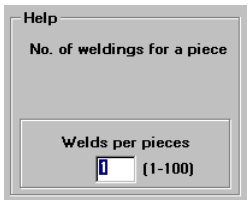


Alarm Threshold
Number of weldings at which dressing or electrode life is set.

Permitted field: 100 – 65500

Spots per Piece
Number of weldings for each piece that can be done with this electrode and with this programme.

Permitted field: 1 – 100



Spots to Dress
Number of weldings after which an electrode dressing is necessary.

Permitted field: 1 – 65500

Spots for Emergency
Number of weldings that can be done after passing the alarm threshold.

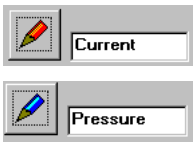
Permitted field: 0 –99

Number of Dressings
Number of dressings allowed by the electrode change.

Permitted field: 0 – 250

Offset Stepper
Starting point of the stepper after the first dressing (increased current).

Permitted field: 0-65500



Increase pressure/increase current switch
This field serves to switch from current stepper to pressure stepper and vice versa.

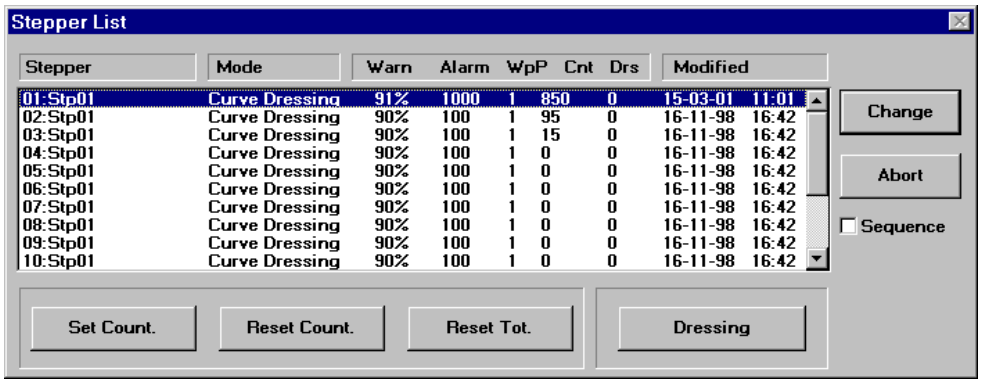
Increase curve
This serves to increase the selected stepper curve, that is by acting on this button the entire stepper curve is moved upwards by 1%.

Decrease curve
This serves to decrease the selected stepper curve, that is by acting on this button the entire stepper curve is moved downwards by 1%..

Reset curve
The selected stepper curve is reset to zero, that is it becomes a straight line at value 0.

Interpolate curve
Acting on this button produces a flattening of the selected stepper curve.

Direct operations on the stepper counter


Stepper List
Stepper
Mode
Warn
Alarm
WpP
Cnt
Drs
Modified
01:Stp01 Curve Dressing 91% 1000 1 850 0 15-03-01 11:01
02:Stp01 Curve Dressing 90% 100 1 95 0 16-11-98 16:42
03:Stp01 Curve Dressing 90% 100 1 15 0 16-11-98 16:42
04:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
05:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
06:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
07:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
08:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
09:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
10:Stp01 Curve Dressing 90% 100 1 0 0 16-11-98 16:42
Change
Abort
Sequence
Set Count.
Reset Count.
Reset Tot.
Dressing

Counter Preset (see also par. 3.1.1)
In the stepper access window the Stepper counter value can be forced.

Reset counter (see also par. 3.1.1)
The stepper counter with a blue background is set to 0.

Reset all counters (Welding Control)
All counters of the welding control are set to 0.

Reset Dressing
After dressing, convalidation is necessary.

2.4.3 Change final value of the curves (Hold Curves option)

In the Change Stepper Parameters window, there is a Hold Curves option controlled by the box ☑ Hold curves

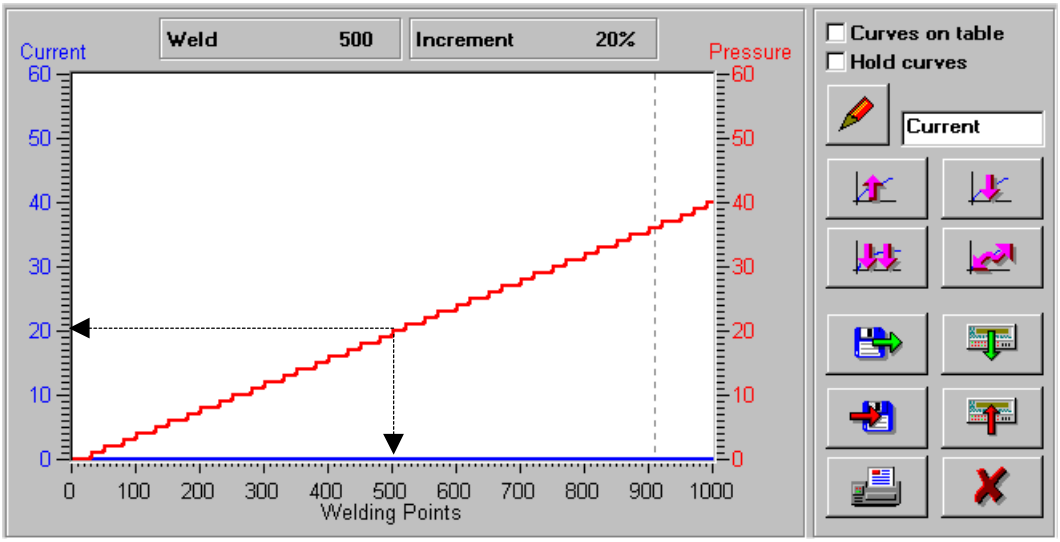
NOTE: *The operation of the "Hold curves" option is identical in the two operational modes (Curve Dressing and Spot Dressing).*
In the examples that follow, a stepper set to the Spot Dressing mode will be analysed, thus the final value of the curve will be the Alarm Threshold.
In the case of a stepper set to the Curve Dressing mode, the final value of the curve will be Spots to Dress

NOTE: *In the "Hold curves" mode, operation is identical for the 2 stepper curves (current increment and pressure increment).*
In the examples below, we will analyse a stepper set to the current increment mode; the situation would remain unchanged if the stepper were set to the pressure increment mode.

The Hold Curves option allows 2 different treatments of the intermediate values of the stepper curve to be defined, as the Alarm Threshold varies.

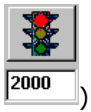
2.4.3.1 Hold Curves option disabled

If the **Hold Curves** option is disabled, when the value of the Alarm Threshold is changed, the slope of the curve from the origin of the axes to the new Alarm Threshold value remains unaltered, while the increments are recalculated to the new electrode life value.

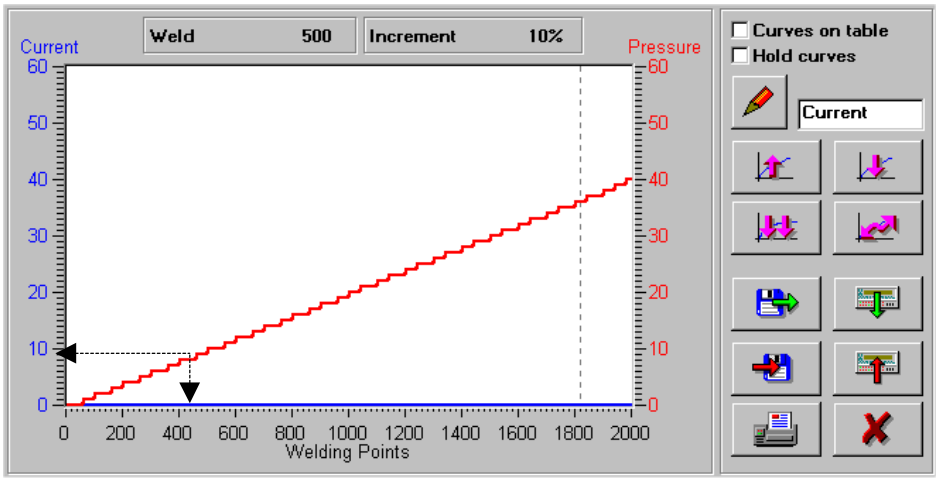


Example: *You want to make the current increase linearly during the life of the electrode and you are looking for the number of welds that the electrode can do.*
The first setting of the curve gives an increment of 40% divided linearly between 0 and 1000 (Alarm Threshold value), see figure above.

At weld no. 500 the increment is 20%

The second setting of the curve, with the option Hold Curve disabled, provides an increment of 40% divided linearly between 0 and 2000 (the value 2000 is inserted in the Alarm Threshold parameter 

).

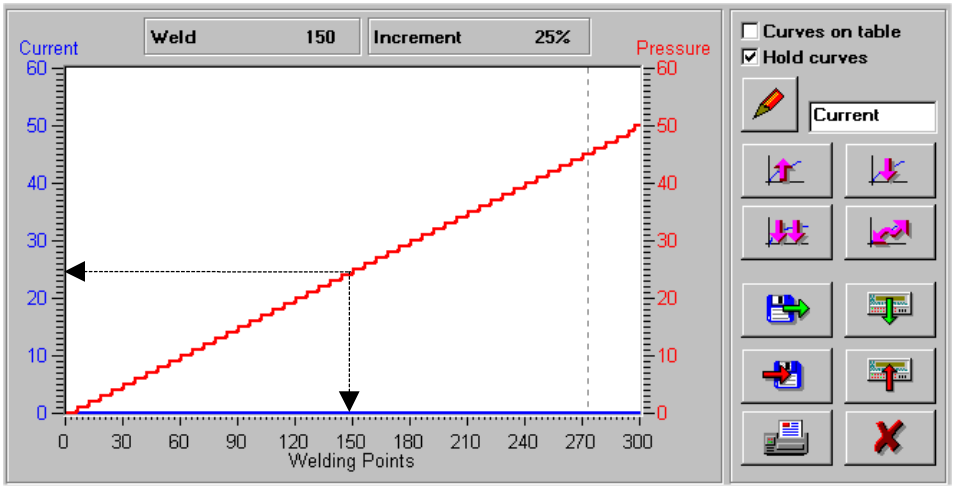


At weld no. 500 the increment is 10%

2.4.3.2 Hold Curves option enabled

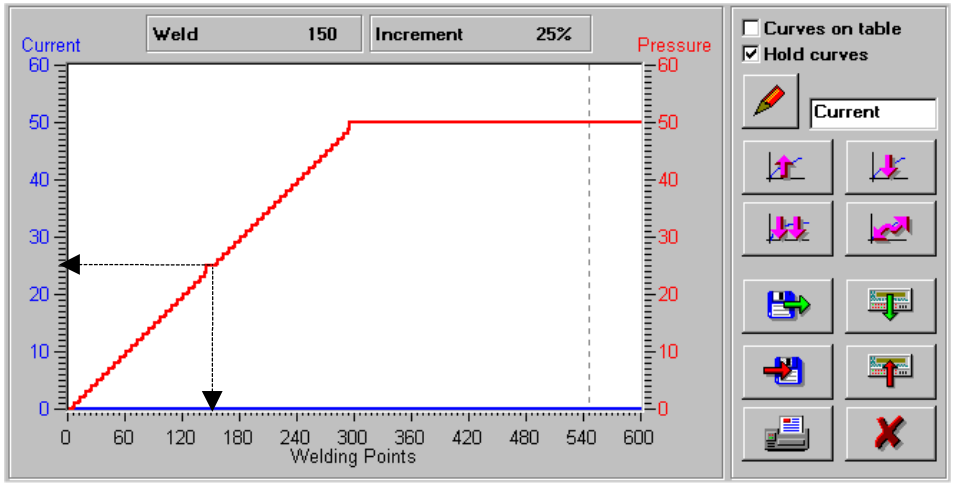
When the ***Hold Curves*** *option* is enabled, there are two possible situations as the Alarm Threshold value is varied:
If the new Alarm Threshold value is below the first setting, the part of the curve between the origin of the axes and the new Alarm Threshold remains unchanged.
If the new value of the Alarm Threshold is above the first setting, the curve remains unchanged and the remaining spots between the end of the curve and the Alarm Threshold take the value of the last spot of the curve.

Example: You want to increase the welding current linearly during the first 300 welds done by the electrode, and you are looking for the number of weldings that the electrode can do.
The first setting of the curve gives an increment of 50% divided linearly between 0 and 300 (Alarm Threshold value).



At welding no. 150 there is an increment of 25%

The second setting of the curve, with the Hold Curves option abilitated, maintains the preceding increment and brings the value of the Alarm Threshold to 600.



Welding no. 150 still has an increment of 25%

2.4.4 Using a table to edit the stepper curve

In the change stepper parameters window there is an option, complete with control box, Curves on Table.
When the option Curves on Table is enabled, the button Insert Stepper Data in Table Form, , located at the top of the window, becomes activated.

NOTE: *The operation of the "Curves on Table" option is identical in the two operational modes (Curve Dressing and Spot Dressing).*
In the examples that follow, a stepper set to the Spot Dressing mode will be analysed, thus the final value of the curve will be the Alarm Threshold.
In the case of a stepper set to the Curve Dressing mode, the final value of the curve will be Spots to Dress

NOTE: *In the "Curves on Table" option, operation is identical for the 2 stepper curves (current increment and pressure increment).*
In the examples below, we will analyse a stepper set to the current increment mode; the situation would remain unchanged if the stepper were set to the pressure increment mode.

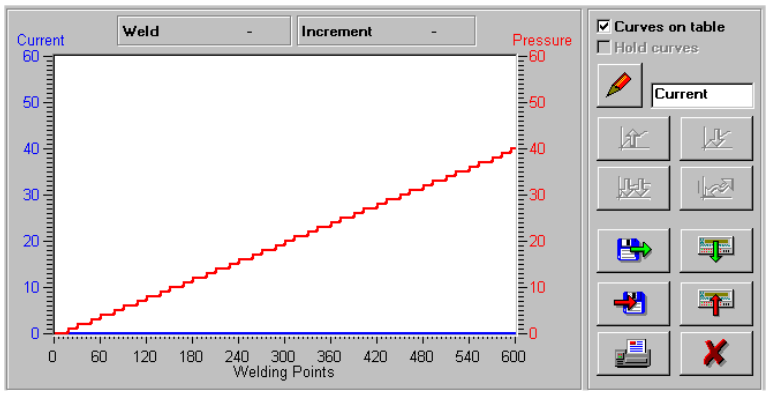
There are two ways of programming increments:

- **Graphic**, using the mouse and the dedicated buttons, 100 incremental steps, (Curves on Table option disabled)
- **Table**, by inserting numerical data, 25 incremental steps, (Curves on Table option enabled)

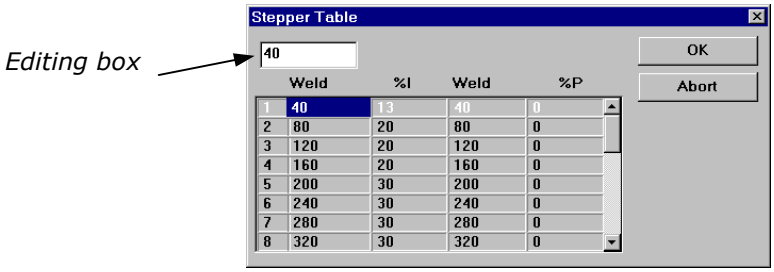
The two modes are mutually exclusive, that is when the Curves on Table option is enabled, the various buttons relating to the graphic editor are not activated.

When you change modes, the percentage value of the increments is converted into the most suitable value for the new step number.
The Graphic mode provides for 100 incremental steps equally distributed between the first welding and the Alarm Threshold value.
The Table mode provides for 25 incremental steps freely distributed between the first welding and the Alarm Threshold value.
After changing to Table edited stepper, the Welding Control calculates the value of the increment for each welding, interpolating between the preceding step value and the subsequent one.
The Table mode allows any interval to be defined between 2 increments, thus allowing large increments to be set during the first weldings with an electrode, and longer intervals when increments are minimal (close to the Alarm Threshold value).

Example: *You want to edit the stepper shown in the graph, by Table mode. The curve provides for a 40% increment divided linearly between 0 and 1000 (Alarm Threshold value).*



a) By clicking on the button Insert Stepper Data in Table Form, *you access the table for numerical data insertion.*



b) With the mouse select a field in the table and the same values as the selected field will appear in the Editing box

c) *Edit the contents of the Editing box with the numerical keys and confirm with the Enter key. The contents of the field will change.*

The complete Table is as follows:

	Weld	**%I**	**Weld**	**%P**
1	40	1	40	0
2	80	2	80	0
3	120	4	120	0
4	160	6	160	0
5	200	7	200	0
6	240	9	240	0
7	280	10	280	0
8	320	12	320	0
9	360	14	360	0
10	400	15	400	0
11	440	16	440	0
12	480	18	480	0
13	520	20	520	0
14	560	22	560	0
15	600	23	600	0
16	640	25	640	0
17	680	27	680	0
18	720	28	720	0
19	760	30	760	0
20	800	31	800	0
21	840	33	840	0
22	880	35	880	0
23	920	36	920	0
24	960	38	960	0
25	1000	40	1000	0
A	**B**	**C**	**D**	**E**

Column A: Progressive number of the increment

Column B: Number of the welding at which the current increment indicated in column C is applied

Column C: Percentage value of the current increment that is applied at execution of the welding indicated in Column B

Column D Number of the welding at which the pressure increment indicated in column E is applied

Column E: Percentage value of the pressure increment that will be applied on execution of the welding indicated in column D

Example: *You want to edit a stepper by defining 5 current increments (2% each) equally distributed between 0 and 20 and subsequently some increments distributed between 20 and 1800 (Alarm Threshold value).*

a) Set the Alarm Threshold value to 1800.

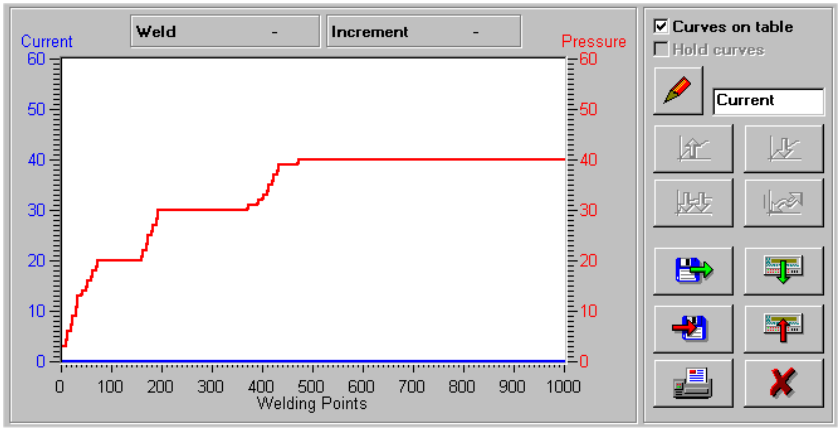
b) Enable the "Curves on Table" option

c) Open the table *and type in the following values:*

	Weld	%I	Weld	%P
1	4	2	72	0
2	8	4	144	0
3	12	6	216	0
4	16	8	288	0
5	20	10	360	0
6	30	10	432	0
7	40	10	504	0
8	50	10	576	0
9	60	10	648	0
10	100	20	720	0
11	150	20	792	0
12	200	20	864	0
13	250	20	936	0
14	300	20	1008	0
15	350	30	1080	0
16	400	30	1152	0
17	500	30	1224	0
18	600	30	1296	0
19	700	30	1368	0
20	800	40	1440	0
21	1000	40	1512	0
22	1200	40	1584	0
23	1400	40	1656	0
24	1600	40	1728	0
25	1800	40	1800	0

For each welding, the welding control will calculate the increment value by interpolating between the value of the previous step and that of the subsequent one.

For example, during the welds between progressive numbers 60 and 100 the current value will gradually be increased from 10% to 20%. When you have finished inserting the parameters in the table, the graph of the increments will look like the figure below



d) Save the data on the welding control using the button Save on Unit

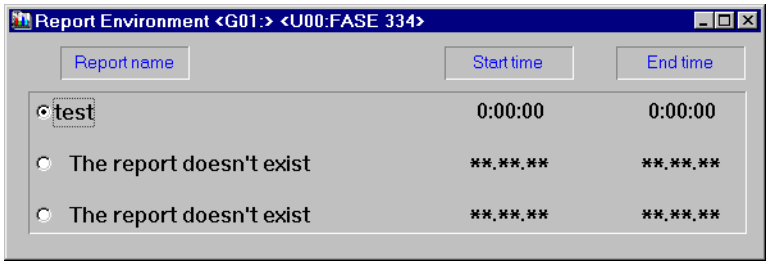
NOTE: *We recommend you do not disable the Curves on Table option, because in that case the data format is modified.*

2.5 *Report*

Using the function key F8 Report or clicking Report E... the Report function opens.

This function enables error statistics to be created for each welding control over a maximum period of 24 hours. The Report must be defined for each welding control. Error messages defined in the configuration and welds executed for each welding control and for each welding programme are determined and processed statistically. Three Reports may be created during a period of 24 hours.

Recalling the Report, the following general screen will appear:



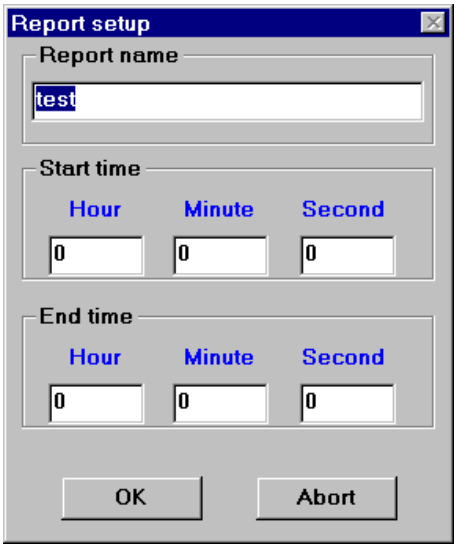
2.5.1 Defining a report

F1 MODIFY With this command the dialogue box opens where you can insert the data to define a report.

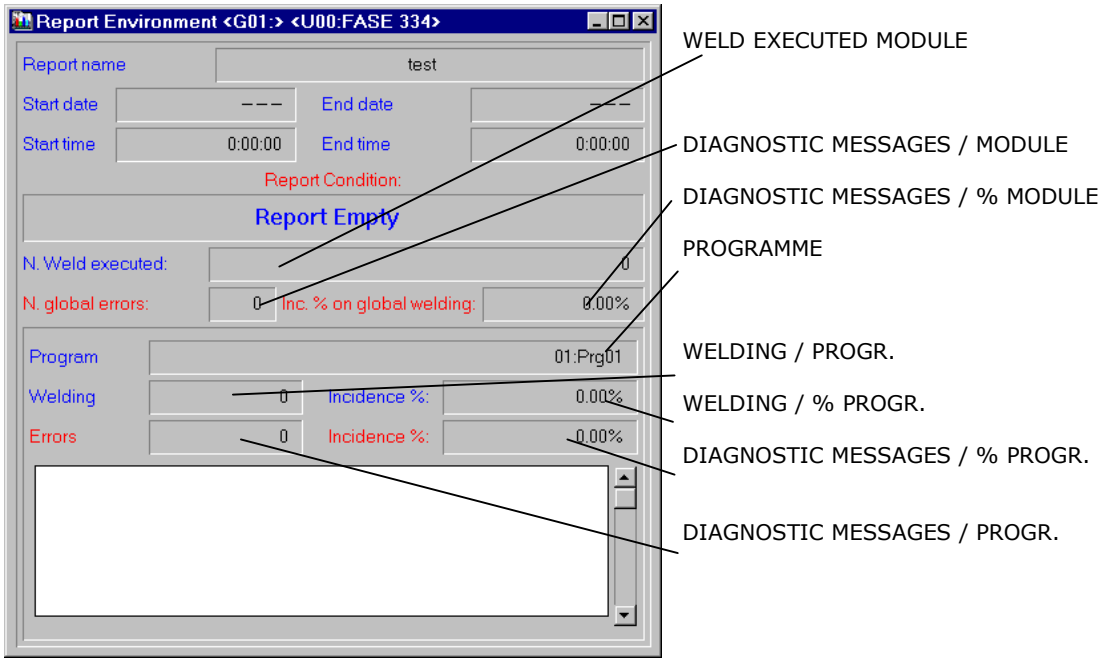
ENTER NAME

ENTER TIME

ENTER TIME



F2 DISPLAY — Using this key you can access Report Processing



F1 Refresh — Update

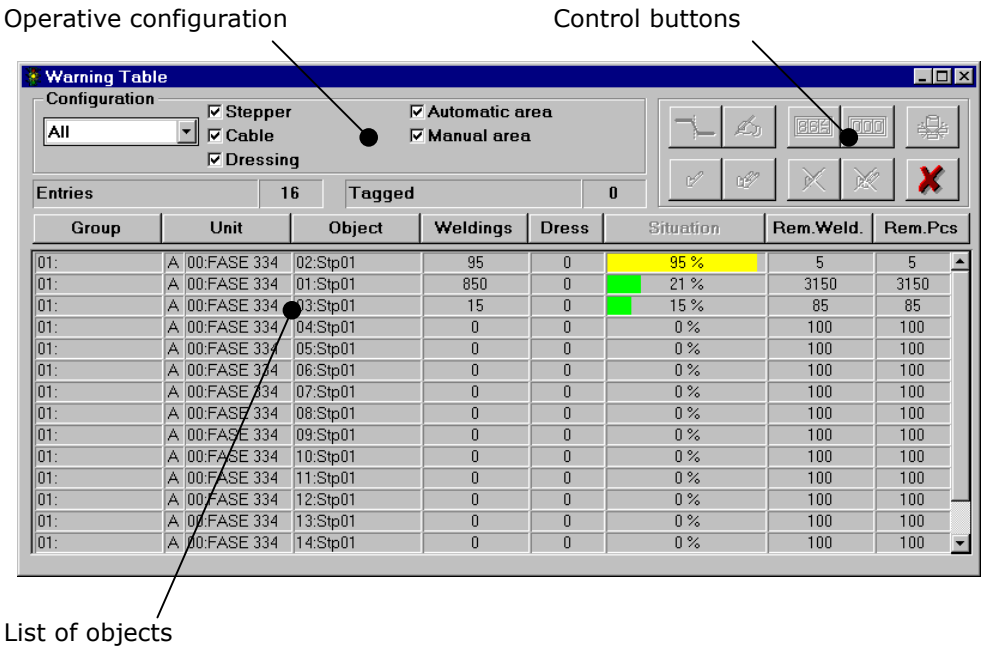
F10 Close — Return to main menu

3. SUPERVISION AND ANALYSIS

3.1 Warnings Table

3.1.1 Viewing characteristics

Pressing the function key F6 Warning or clicking the icon Warning ... the Warnings Table opens. This table enables you to monitor in real time all the stepper (electrodes) cable and dressing tool counters of all welding controls in the network.
The operator may at any time select the most suitable viewing criteria.
Direct access to the stepper programmes is also possible, to view and if necessary change the parameters, as well as to the counters, to reset them either individually or collectively, or to change the individual current value.



The window is subdivided into three parts: operative configuration, control buttons and list of objects.

- The operative configuration enables selection of the criteria with which objects (stepper, cable and dressing tool counters) are displayed in the list; you can select for example the counter status (warning, piece threshold or all), the type of counter (any combination among stepper, cable and dressing tool) and the type of area (manual, automatic or both types).
- The control buttons enable you to act. Using these buttons you can set and reset counters, record dressing cycles (reset the welding counter and increase the dressing counter of one or more steppers), programme thresholds and in general view and change parameters.
- In the list of objects the objects are displayed in function of the chosen criteria. You can reorder the objects by any of the fields.

The object that is tagged automatically deselects after sending a command to the welding control.

Status colours in the Warnings Table

***NOTE**: We recommend using the "Windows standard" combination of options in the Windows Screen Properties menu.*

Each object in the Warnings Table may be in one of 4 specific situations, indicated by the following colours:

Object status	Colour of text	Colour of back ground	Notes
Detagged	Black*	Grey**	
Current	White	Grey**	
Current tagged	White	Black	Symbol → in the status column
Non-current tagged	Yellow	Black	Symbol → in the status column

This distinction is important to send the correct command to the welding control, on the basis of the counter's status.
An object's status may be changed by using special buttons or by double clicking with the mouse on the object.

***NOTE**: some colours (those marked*) relate to the following colour options:*

- *Windows standard* in the Screen Properties menu of Windows9X
- *Predefined in the colour options in the* Windows Control Panel, thus if you change these options, the colours will change, in particular:

  * Black is the colour selected for "text";

  ** grey is the colour selected for "buttons";

  The colours without an asterisk are independent of the screen options selected (forced colours).

3.1.2 Operative configuration

The figure shows the configuration area in the operative mode. Here you can select the criteria with which the system determines the elements to display in the list.

Display criteria

The situation for counter display may be selected from the drop-down list:

- **Warning**
  Only those counters (stepper, cables and dressing tools) that have reached or passed the warning threshold are displayed. Counters not meeting this criterion are not listed.

- **Pieces Threshold**
  Only those counters for the steppers for which the number of pieces remaining is below or equal to the set threshold are displayed (see Selection of Pieces Threshold). When you select this mode, cable and dressing tool counters are not listed. The number of pieces remaining is determined from the number of sample welds effected and the alarm threshold parameters and spots per piece programmed in the stepper. Please note that when this mode is activated, counters of steppers that do not meet this requirement for the pieces threshold and all cable and dressing tool counters, even if in warning or alarm situation, are not displayed.

- **All**
  In this mode, all counters (stepper, cable and dressing tool) are displayed whatever their status. Only those counters that are disabled in general or relate to non-existent steppers are not listed (see Configuration).

Type of Object

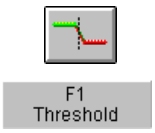
The three selection boxes, Electrodes, Cables and Dressing, select the type of counters to be displayed in the list. If you select Electrodes, the stepper counters will be displayed, whereas if you select Cables the cable counters will be displayed. Similarly if you select the box Dressing then the dressing tool counters will be displayed. Any combination of the three options is possible and thus you can display all the corresponding types of counters at the same time. It is impossible, for obvious reasons, to deselect all the boxes at the same time. If you have selected the Pieces Threshold display option, the three boxes will be disabled; they cannot be selected since with that criterion only the stepper counters are displayed.

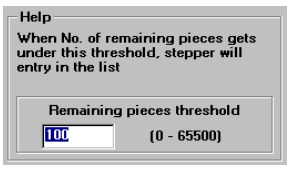
Type of Area or Device

The two boxes *Automatic Area and Manual Area* allow you to choose the type of device whose counters will be displayed in the list. In this case too you must select at least one box.

3.1.3 Control Buttons

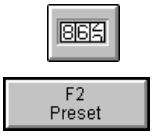
All operations available in the Warnings Table can be performed with these buttons.

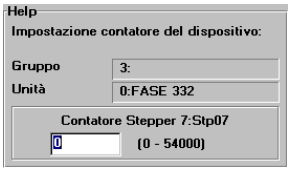



Help
When No. of remaining pieces gets under this threshold, stepper will entry in the list
Remaining pieces threshold
100
(0 - 65500)

Select Pieces Threshold

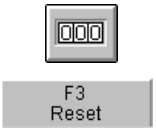
This button enables you to access the dialogue box where you can insert the minimum pieces threshold after which the stepper counter is displayed in the list. This button is only active when the Pieces Threshold display criterion has been selected. The window contains a short description of the parameter and the minimum and maximum values that this parameter may take.





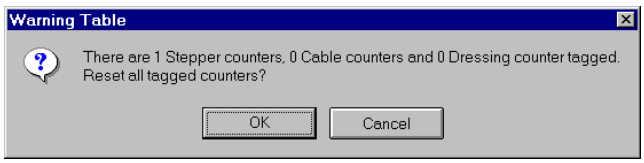
Counter setting

This function enables you to force the current counter (not to be confused with the tagged counters) to a specific value. Depending on whether the current object is a stepper counter, a cable counter or a dressing counter, you will access the corresponding dialogue box. The dialogue box displays both the identification of the counter on which the operation will be done and the field of values acceptable for it.



Resetting

With this function you can reset the current counter to zero, or, in case of tagging, you can reset the tagged counters, whatever type they are. In the second case, you can reset a mixed combination of stepper counters, cable counters and dressing counters.
Before acting, the system requests the operator for confirmation, displaying a summary of the operation (type and number of counters involved).


Warning Table
There are 1 Stepper counters, 0 Cable counters and 0 Dressing counter tagged.
Reset all tagged counters?
OK
Cancel

If no counters are tagged and there is no current object, this button is disabled.

Stepper Dressing
This function enables a dressing cycle to be recorded (resetting the welding counter to zero and increasing the dressing counter) for the current stepper or, if a selection has been tagged, for the tagged stepper. Any tagged cable counters or dressing counters will obviously be ignored.
Before acting the system requests the operator for confirmation by displaying the number of stepper counters involved.

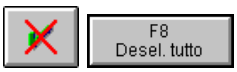
If there are no tagged steppers and no current stepper the button is disabled.

Tagging an object
This button may be used to select the current object. The operation can also be done with the mouse.
The number of objects present in the list and the number of tagged objects is indicated in the special field immediately below the area dedicated to configuration of the operative mode.
The button is only active if an object is defined as current (highlighted) and is not tagged in a selection.

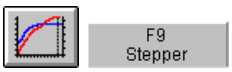
It is extremely important to understand the difference between a tagged (selected) object and the current object. A tagged object is displayed in the list with yellow text on a black background with an arrow (->) to the left of the percentage value, whereas by current object is meant the object highlighted in the list, displayed with the colours selected by the user, through the Windows control panel, for highlighted text and the background selected as that for highlighted text (see Fig 6). To avoid confusion between tagged object and current object, we recommend not using the same colours for highlighted text that the Warning Table uses for tagged objects (yellow text on black background).

Tag all
Tags all the objects present in the list.

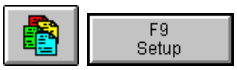
Untag object
Untags the current object. It is only active if the object defined as current object is tagged.



Untag all
Untags all the objects present in the list. It is only active if at least one object is tagged.



or

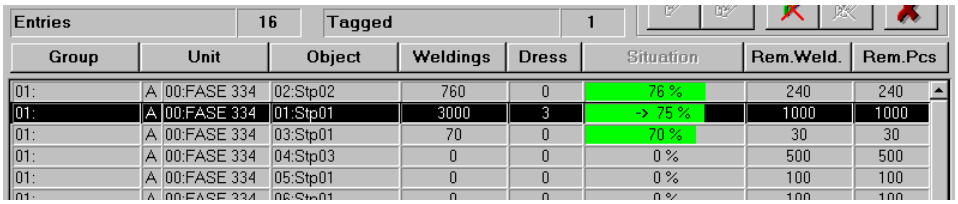


Change parameters
Recalls the editing function associated with the current object allowing its parameters to be changed. If the current object is a cable or a dressing tool, the Configuration function of the welding control in question is activated, whereas in the case of a stepper you enter directly into the relative Change Parameters window.

Exit
As in all WMS functions, this key closes the function. All parameters relating to the configuration of the operative mode, the piece threshold and criteria for sorting the list will automatically be stored and on reopening the function they will be reactivated.

3.1.4 Object list

The list contains all the objects that meet the requirements specified in the configuration of the operative mode. Each object embraces more than one field containing various types of information, such as identification of the welding control, number of weldings, status, etc. The list is automatically updated about every 5 seconds. The number of objects present is indicated in the field immediately above the list itself. The list may be scrolled using the scroll bar on the right.



Object list

Group
This field indicates the number and name of the logical group to which the welding control for the counter displayed belongs. Clicking this button will sort the objects on the list in increasing order by number of group.

Unit
This field indicates the type of device (M or A respectively for Manual or Automatic device), the number of logical units and the name of the welding control relating to the counter displayed.

Object
This field indicates the type of object to which the counter relates: stepper, cable or dressing tool. In the case of a stepper counter, the number and name of the stepper is also given. In the case of a cable counter, the identification of the cable (A or B) is given.
Clicking this button, you sort the list as follows: first the steppers, then the cables, both in decreasing order by number of weldings, and lastly the dressing tools.

Weldings
This field indicates the number of weldings done respectively by a stepper or by a cable. In the case of the steppers these are reference sample weldings, while for the cables they are the effective weldings. This field is not used for the dressing tools (-).
Clicking this button, you sort the list as follows: first the steppers, then the cables, both in order of decreasing number of weldings, lastly the dressing tools.

Dressings
This field, used both for the steppers and for the dressing tools, indicates the number of dressings done. This field is not used for the cables (-).
By clicking this button, you sort the list as follows: first the steppers then the dressing tools, both in decreasing order of number of dressings, and lastly the cables.

Status
This field indicates, both in graphic form and numerically, the percentage of operations done related to the alarm threshold set. The percentage bar is of a different colour depending on the level reached: **Green** if the counter has not yet reached the warning threshold, **Yellow** if it has reached the warning

threshold and lastly **Red** if it has reached or passed the alarm threshold. Tagged objects are indicated with an arrow (→) to the left of the percentage value.
By clicking this button, the objects are sorted in decreasing order by the percentage value reached.

Remaining welds

This field indicates the number of weldings that can still be done before reaching the alarm threshold that has been set. This field is not used for the dressing tools (-).
By clicking this button, you order the list as follows: first the steppers, then the cables, both in increasing order by number of weldings that remain, and lastly the dressing tools.

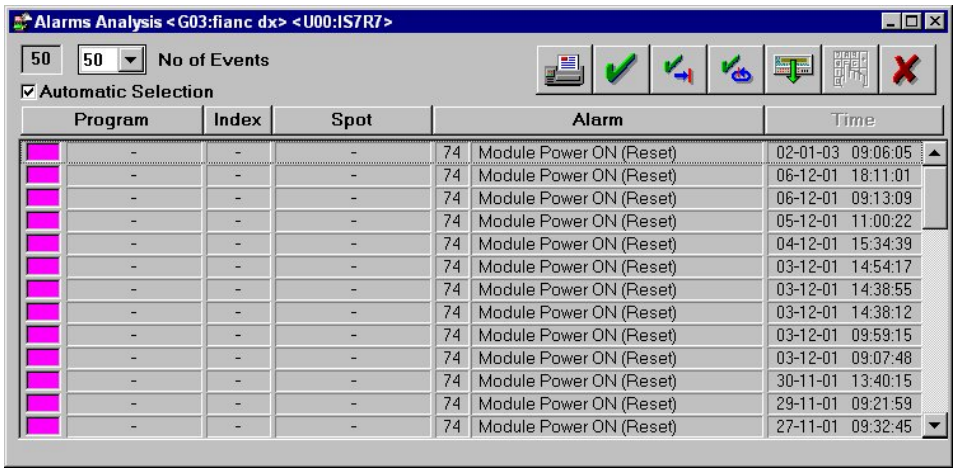
Remaining pieces

This indicates the number of pieces that can still be welded before reaching the alarm threshold set. This value is determined by the parameter "spots per piece" that the operator programmes in the stepper. If the object is a cable counter or a dressing tool counter, this field is meaningless (-).
By clicking this button, you sort the list as follows: first the steppers, in increasing order by number of remaining pieces, then the cables and lastly the dressing tools.

***NOTE**: In the case of a stepper set to the "Curve dressing" mode, the percentage bar in the "Status" column represents the total electrode life, thus 100% is reached on totalizing the number of weldings equal to: [Spots to dress * (Number of dressings + 1)]. Similarly, the values indicated in the columns Weldings, Remaining Weldings, Remaining Pieces, are calculated considering the number of dressings done.*

3.2 *Alarms analysis*

Pressing the function key F5 Alarms or clicking the icon Alarms A... the Alarms analysis window is displayed.

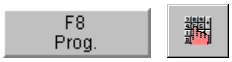

Alarms Analysis <G03:fianc dx> <U00:IS7R7>
50
50
No of Events
Automatic Selection
Program
Index
Spot
Alarm
Time
74 Module Power ON (Reset) 02-01-03 09:06:05
74 Module Power ON (Reset) 06-12-01 18:11:01
74 Module Power ON (Reset) 06-12-01 09:13:09
74 Module Power ON (Reset) 05-12-01 11:00:22
74 Module Power ON (Reset) 04-12-01 15:34:39
74 Module Power ON (Reset) 03-12-01 14:54:17
74 Module Power ON (Reset) 03-12-01 14:38:55
74 Module Power ON (Reset) 03-12-01 14:38:12
74 Module Power ON (Reset) 03-12-01 09:59:15
74 Module Power ON (Reset) 03-12-01 09:07:48
74 Module Power ON (Reset) 30-11-01 13:40:15
74 Module Power ON (Reset) 29-11-01 09:21:59
74 Module Power ON (Reset) 27-11-01 09:32:45

Via this function you can consult the Alarms History for the welding controls in the network and you can act to define the number of events or reset any alarms in progress.
The boxes in the column "Programme" give the colour relating to the alarm (see paragraph 1.3.4 for the meaning of each colour).

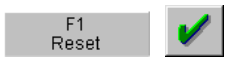
3.2.1 Description of commands

Number of diagnostic messages (no. of events)
In the box at the left the number of alarms that have occured up to this moment is displayed.
Clicking on the drop-down menu you can set the number of alarms to be stored.

Automatic selection of welding control
By ticking the box you automatically update the window every time you select a new welding control.



Edits the Welding Programme involved in the alarm



Normal: this sends the normal alarm reset command.

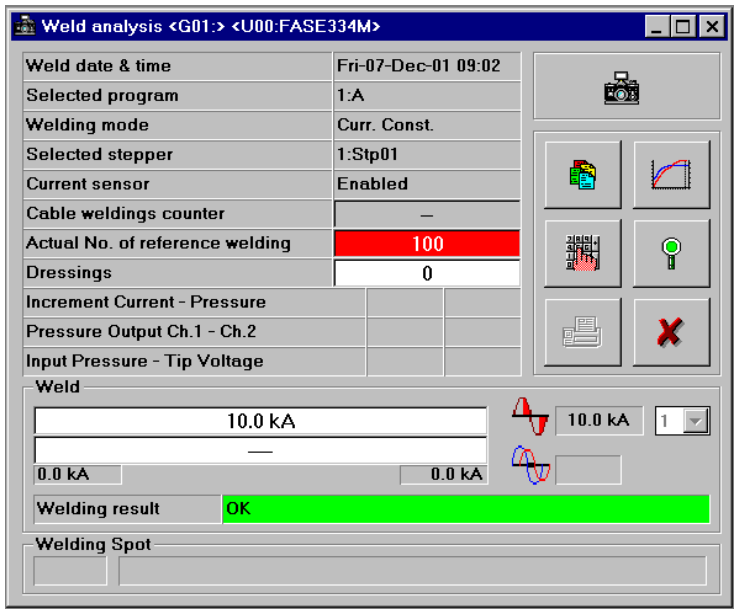
Sequence end: the alarm is initialized and the welding control ends at sequence end.

Sequence repeat: the alarm is initialized and the welding control continues with the welding sequence.

Alarm update
The alarms table is not automatically updated in order not to overload the network. To update it click on the key shown to the left.

3.3 Weld analysis

This menu allows you to analyse the weld just done. To select it, press the function key F1 Analisys or click on the icon Weld ana... .
This function gives a numerical and graphical display of the stepper counters for the electrodes and the gun cables.
The number indicates the weldings done while the bar indicates the percentage of welds done versus the alarm threshold (Alarm threshold = 100%).
The bars take on different colours depending on the status.



Welding result: The bar indicates the current as a percentage of the nominal value set.

The bars for the sample welding counters and the welding cable counters can take the following colours, depending on the status of the counters:

- **GREEN**: Counter in normal condition.
- **YELLOW**: Counter in Warning condition (>=Warning Threshold).
- **RED**: Counter in Alarm condition (>= Alarm Threshold).

3.3.1 Description of commands

F4 Setup — Direct access to Configuration

F6 Disable — Enable/Disable

F3 Stepper — Direct access to Stepper programming

F5 Prog. — Edit Welding Programme

Current measured

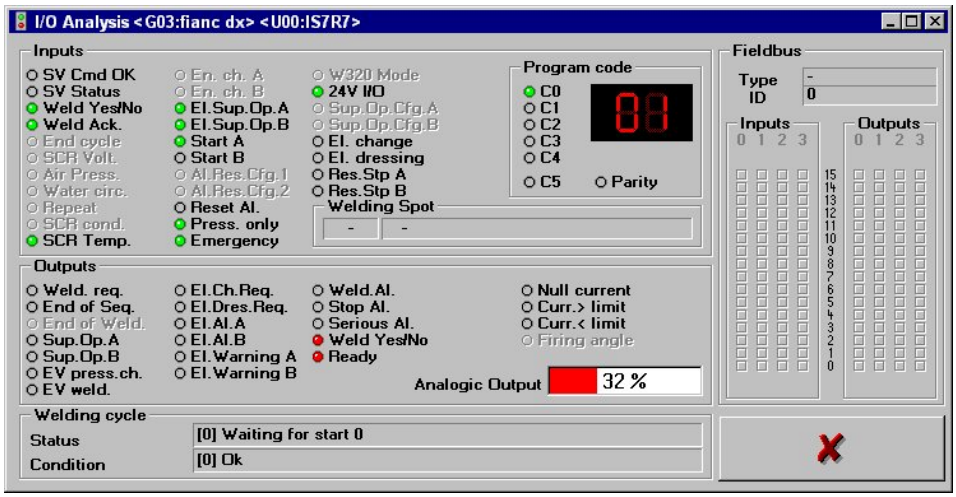
Cos phi measured

Select special pulse to analyse

3.4 I/O Analysis

By selecting the icon

from the main menu or using the function keys F10 Etc. plus F7 Analisys I/O, you can display in real time the logical status present on the Inputs and Outputs of the welding control selected.
The logical status is updated in real time, compatibly with the network traffic.
The status of the inputs and outputs relates to the configuration of the welding control, thus the functions that are not used are disactivated (grey in colour).
The I/O analysis window looks like this:

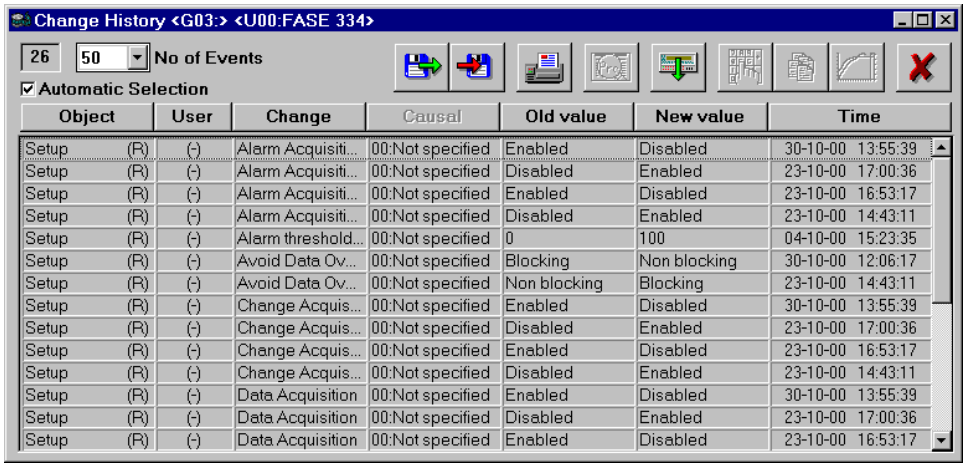


In the lower part of the I/O analysis window, the following are represented:

- **Status**: the current pass of the welding cycle
- **Condition**: the condition expected by the welding control to continue with the welding cycle.

3.5 Analysis of changes

This window is opened with function keys F10 Etc. plus F5 Changes or by clicking the icon Change ... . A table appears containing the latest changes. For each welding control up to a maximum of 500 changes can be displayed.


Change History <G03:> <U00:FASE 334>
26
50
No of Events
Automatic Selection
Object
User
Change
Causal
Old value
New value
Time
Setup (R) (-) Alarm Acquisiti... 00:Not specified Enabled Disabled 30-10-00 13:55:39
Setup (R) (-) Alarm Acquisiti... 00:Not specified Disabled Enabled 23-10-00 17:00:36
Setup (R) (-) Alarm Acquisiti... 00:Not specified Enabled Disabled 23-10-00 16:53:17
Setup (R) (-) Alarm Acquisiti... 00:Not specified Disabled Enabled 23-10-00 14:43:11
Setup (R) (-) Alarm threshold... 00:Not specified 0 100 04-10-00 15:23:35
Setup (R) (-) Avoid Data Ov... 00:Not specified Blocking Non blocking 30-10-00 12:06:17
Setup (R) (-) Avoid Data Ov... 00:Not specified Non blocking Blocking 23-10-00 14:43:11
Setup (R) (-) Change Acquis... 00:Not specified Enabled Disabled 30-10-00 13:55:39
Setup (R) (-) Change Acquis... 00:Not specified Disabled Enabled 23-10-00 17:00:36
Setup (R) (-) Change Acquis... 00:Not specified Enabled Disabled 23-10-00 16:53:17
Setup (R) (-) Change Acquis... 00:Not specified Disabled Enabled 23-10-00 14:43:11
Setup (R) (-) Data Acquisition 00:Not specified Enabled Disabled 30-10-00 13:55:39
Setup (R) (-) Data Acquisition 00:Not specified Disabled Enabled 23-10-00 17:00:36
Setup (R) (-) Data Acquisition 00:Not specified Enabled Disabled 23-10-00 16:53:17

3.5.1 Description of commands

In the box at the left the number of changes made up to this moment is shown.
By clicking on the drop-down menu you can set the number of changes to be stored.

By ticking the box you activate automatic updating of the window every time you select a new welding control.

Load from disk

Save on disk

F5 Refresh

Update

F8 Prog.

Edit the welding programme

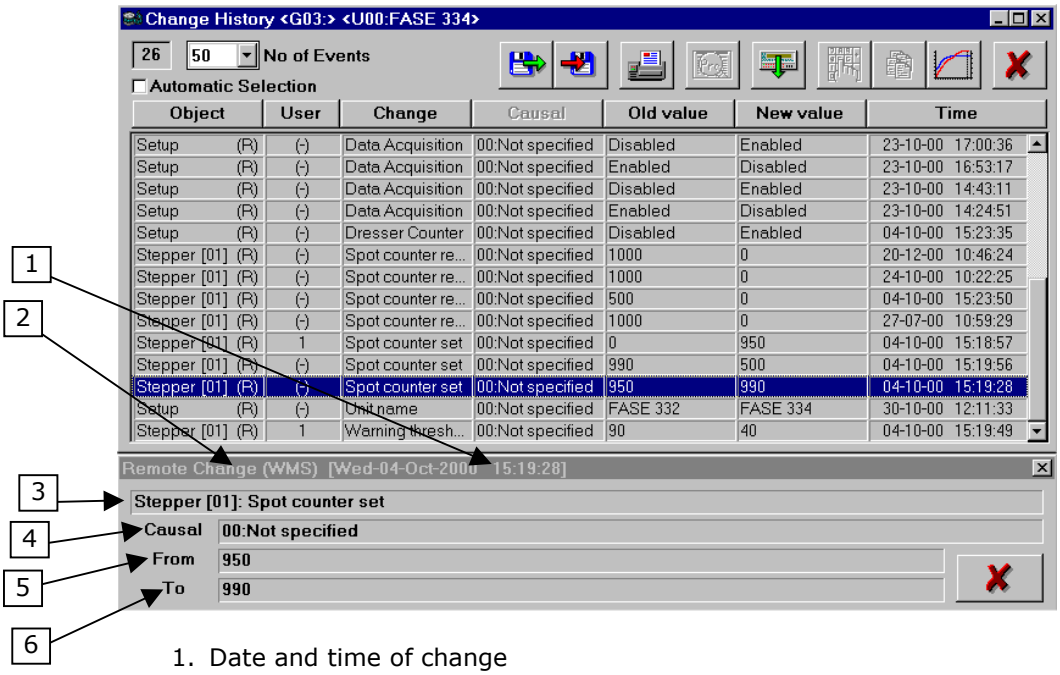
F8 Setup

Edit the current Setup

F9 Stepper

Edit the corresponding stepper

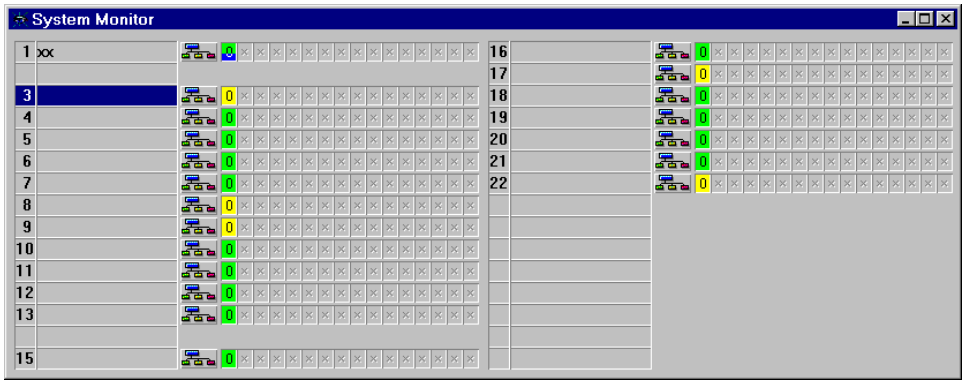
Display details of the tagged item (see next figure)


Change History <G03:> <U00:FASE 334>
26
50
No of Events
Automatic Selection
Object
User
Change
Causal
Old value
New value
Time
Setup (R) (-) Data Acquisition 00:Not specified Disabled Enabled 23-10-00 17:00:36
Setup (R) (-) Data Acquisition 00:Not specified Enabled Disabled 23-10-00 16:53:17
Setup (R) (-) Data Acquisition 00:Not specified Disabled Enabled 23-10-00 14:43:11
Setup (R) (-) Data Acquisition 00:Not specified Enabled Disabled 23-10-00 14:24:51
Setup (R) (-) Dresser Counter 00:Not specified Disabled Enabled 04-10-00 15:23:35
Stepper [01] (R) (-) Spot counter re... 00:Not specified 1000 0 20-12-00 10:46:24
Stepper [01] (R) (-) Spot counter re... 00:Not specified 1000 0 24-10-00 10:22:25
Stepper [01] (R) (-) Spot counter re... 00:Not specified 500 0 04-10-00 15:23:50
Stepper [01] (R) (-) Spot counter re... 00:Not specified 1000 0 27-07-00 10:59:29
Stepper [01] (R) 1 Spot counter set 00:Not specified 0 950 04-10-00 15:18:57
Stepper [01] (R) (-) Spot counter set 00:Not specified 990 500 04-10-00 15:19:56
Stepper [01] (R) (-) Spot counter set 00:Not specified 950 990 04-10-00 15:19:28
Setup (R) (-) Unit name 00:Not specified FASE 332 FASE 334 30-10-00 12:11:33
Stepper [01] (R) 1 Warning thresh... 00:Not specified 90 40 04-10-00 15:19:49
Remote Change (WMS) [Wed-04-Oct-2000 15:19:28]
Stepper [01]: Spot counter set
Causal
00:Not specified
From
950
To
990
1
2
3
4
5
6

1. Date and time of change
2. Origin of the change (Local/Remote)
3. Parameter changed
4. Grounds for the change
5. Value before the change
6. Value after the change

3.6 System Monitor

This summary can be opened by pressing the function keys F10 Etc. plus F2 Monitor or by clicking on the icon System M...

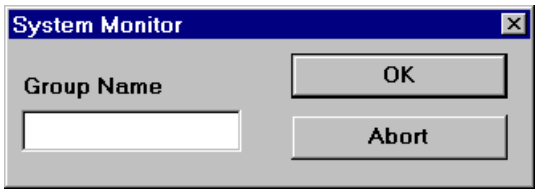


All the welding controls connected to and recognized by the system are displayed, subdivided into groups.

Group Name

F1 Name

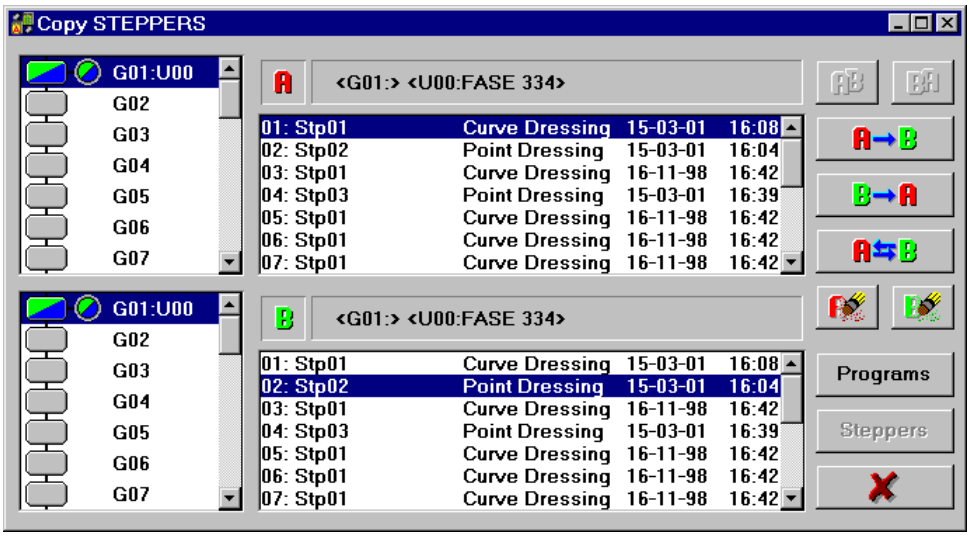
After pressing this key you can type in the name of the selected group in this box, or change it. The group is tagged by clicking on the corresponding line.



4. DATA MANAGEMENT

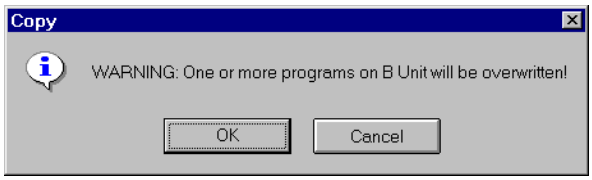
4.1 Copy/Delete Welding and Stepper programmes

Using the function key F9 Copy or the icon Copy you can access the functions COPY and DELETE welding and stepper programmes.
In the window that opens you can select the welding controls among which you want to copy, move or compare programmes or steppers.



Steppers	F1 Steppers	To pass to copying the "**STEPPERS**"
Programs		To switch from "**Copy: STEPPERS**" to "**Copy: PROGRAMMES**"
	F3 Duplicate A	All the programmes, all the steppers and all the configurations will be copied from the welding control selected at "**A**" to that at "**B**".
	F4 Duplicate B	All the programmes, all the steppers and all the configurations will be copied from the welding control selected at "**B**" to that at "**A**".
	F5 Copy A->B	The programmes and/or the steppers selected will be copied from the welding control at "**A**" to that at "**B**". You can copy from one programme to another within the same welding control!
	F6 Copy B->A	The programmes and/or the steppers selected will be copied from the welding control at "**B**" to that at "**A**". You can copy from one programme to another within the same welding control!
	F7 Exchange A-B	The programmes selected at "**A**" will be exchanged for those selected at "**B**"
	F8 Delete A	The programmes and/or the steppers selected at "**A**" will be deleted
	F9 Delete B	The programmes and/or the steppers selected at "**B**" will be deleted

If, when executing one of these functions, existing data is about to be overwritten, the following message will draw your attention to this fact:

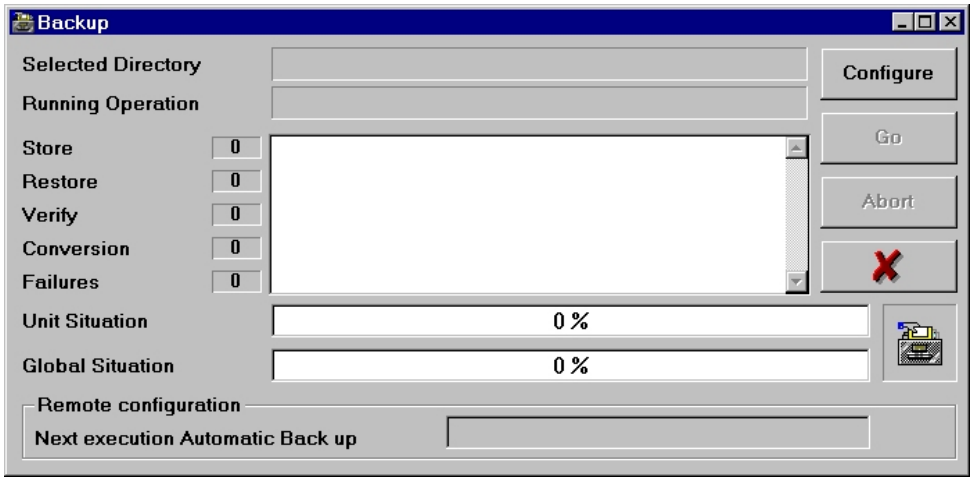


If you select "**OK**", the function will be completed, which means that the existing data will be overwritten. If you select "**Cancel**" the function will not be executed and thus the existing data will remain. You may either proceed with a different selection or exit the "**Copy**" function.

4.2 Filing (Backup)

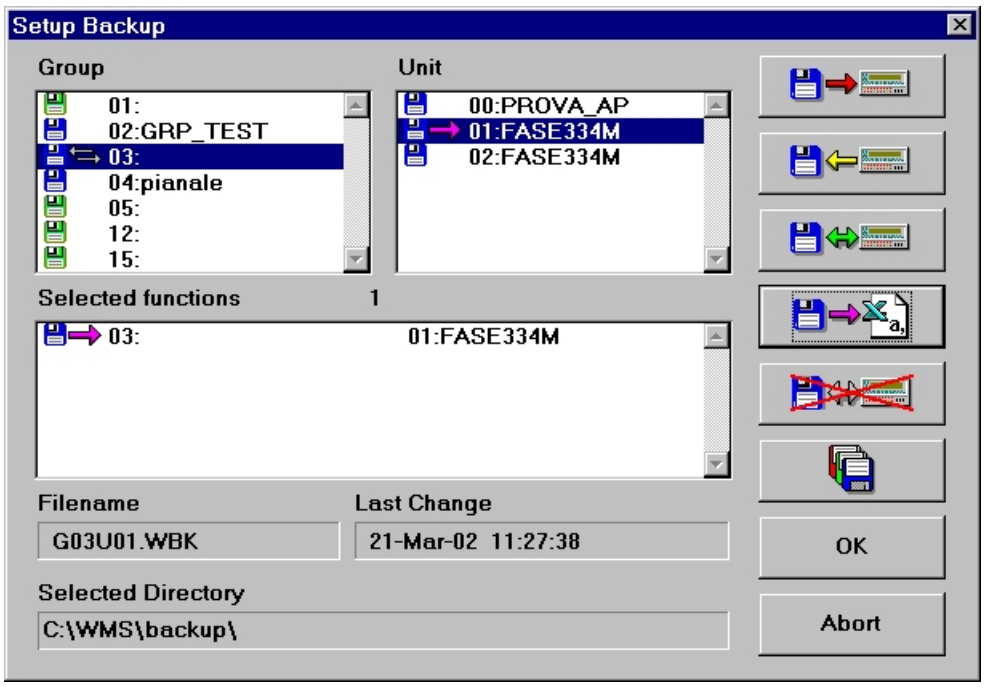
Copies of the Setup (Configuration) or of Welding Programmes and Steppers for each individual welding control can be stored in a specific archive using the Backup function. The data stored can then be compared/loaded onto the welding control.

This function may be accessed using the function keys F10 Etc. plus F1 Backup or the icon Backup.



Selecting the drive and the directory

Using "**Configure**" you can access the Windows menu to define directory where the backup files will be stored.
Having selected the drive and directory desired, confirm with "**OK**" to open the "**Setup Backup**" window:

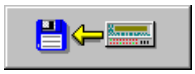


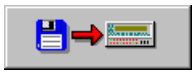
Selecting the welding controls

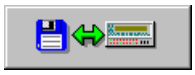
In the windows **Group** and/or **Unit** select the welding control involved in the backup session.

Backup operations

Using the command buttons, the following operations may be done:

1) Backup  Store contents of control memory on disk and/or on hard disk.

2) Reinstate  Load from disk and/or hard disk onto the welding control memory.

3) Verify/ Compare  Compare between backup files on disk/hard disk and control memory.

4) Convert Convert selected backup files into CSV format

Delete operations implicated in current selection

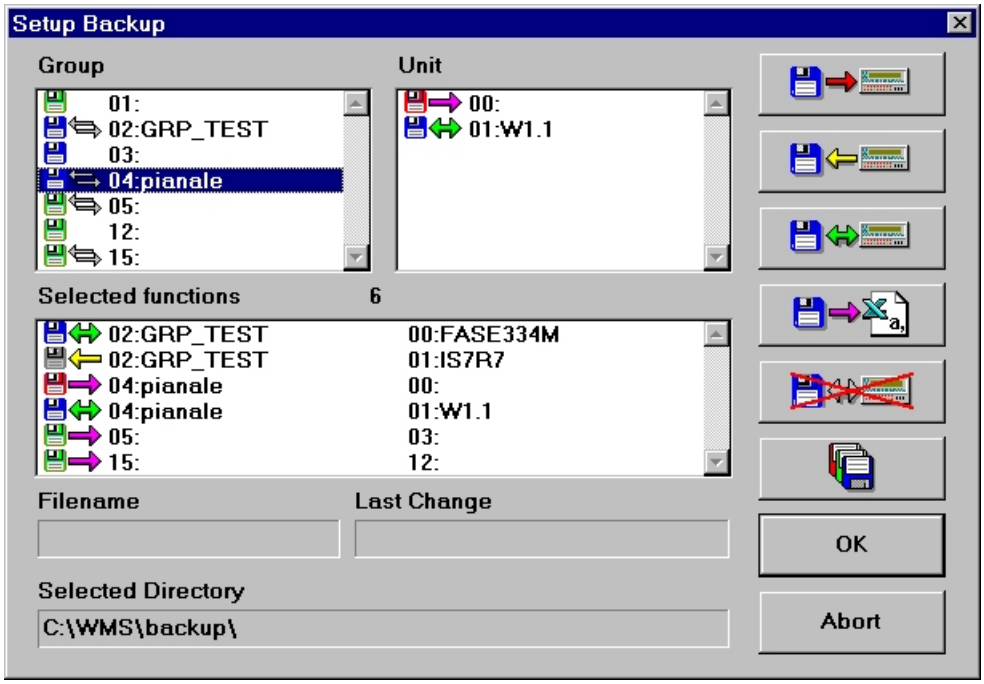
Select drive and/or directory

The backup status of each group and of each unit can be recognised by the colour of the associated icon:

COLOUR	STATUS	OPERATIONS ENABLED
BLUE	The control is configured in WMS, it is present in the network and the corresponding backup file exists in the selected directory.	*Backup* *Reinstate* *Verify* *Convert*
BLACK	The control is configured in WMS, it is present in the network but **the corresponding backup file does not exist** in the selected directory**.**	*Backup*
RED	The control is configured in WMS, it is **not present in the network** but the corresponding backup file exists in the selected directory.	*Convert*
GREEN	**The control it is not configured** in WMS (thus it is not present in the network) but the corresponding backup file exists in the selected directory.	*Convert*

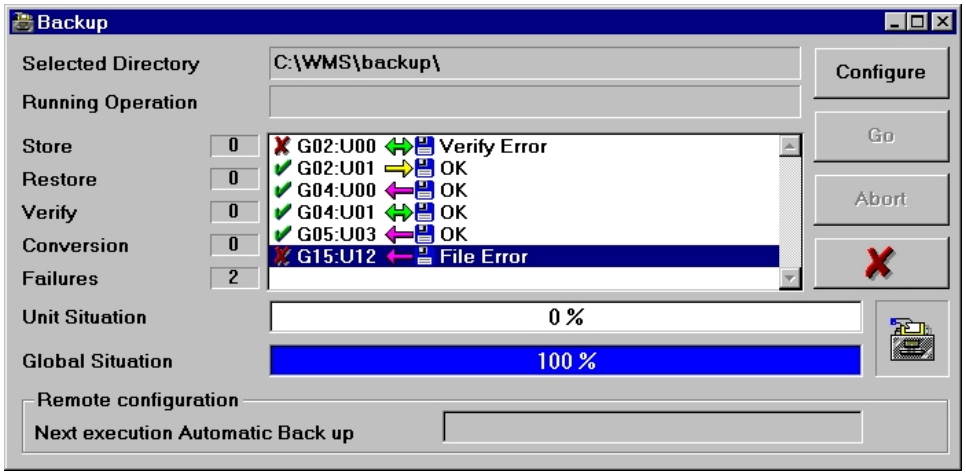
***NOTE**: All the functions exclusively refer to the selected directory.*

Having selected the group and/or unit, click on the button for the desired operation.
The details of the operation thus selected will be displayed in the window **Selected functions**.



During the same backup session it is possible to perform a different operation for each control.
The Backup function automatically defines the backup file name with the numbers of the group and of the unit with which the welding control has been configured in WMS.

By pressing **OK** you return to the Backup dialogue box in which the pathway of the working directory selected is now displayed together with the list of operations selected.
By clicking on **Execute** or **F3** the procedure begins, at the end of which the *Global Situation* status bar indicates it has been completed.



Any errors found are clearly indicated: thus the user can make suitable corrections and relaunch the functions that previously failed.

4.2.1 Conversion to CSV file

The conversion function trans-codifies the contents of files in backup format (**.wbk**) transcribing them into files in CSV format (**.csv**).
It may be activated by users at any level (administrator, programmer, operator and archivist).
The conversion procedure generates files that can normally be imported into spread sheets and data bases (typically Microsoft Excel and Access).
These conversion files constitute specific archives of the functionality of the welding controls. A file with a predefined name with the extension **.csv** corresponds to each archive. During the same session, more than one conversion functions can be performed in sequence. The results are sent to the same group of files:

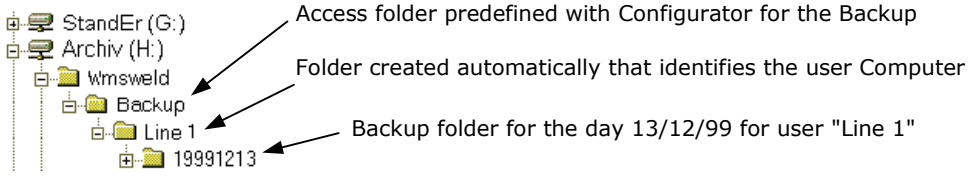
Functionality of controls	**File name**
1) SETUP	setup.csv
2) PROGRAMMES	weldprog.csv
3) INCREMENTAL STEPPERS	stepper.csv
4) TABULAR STEPPERS	steppert.csv
5) SPOT REFERENCE	spotref.csv

In each conversion file, the first record contains field headings (thus for import into Microsoft Access, in the relative dialogue box, tick to indicate that the first line of the file contains that headings). In each subsequent record the fields relating to the numbers of group and of unit enable provenance to be identified.
Each backup session that involves conversion operations produces the unconditioned overwriting of the whole series of .csv files. It may happen that some .csv files are empty due to the absence of some type of data (for example absence of stepper). These empty files in any case contain the record of the headings.

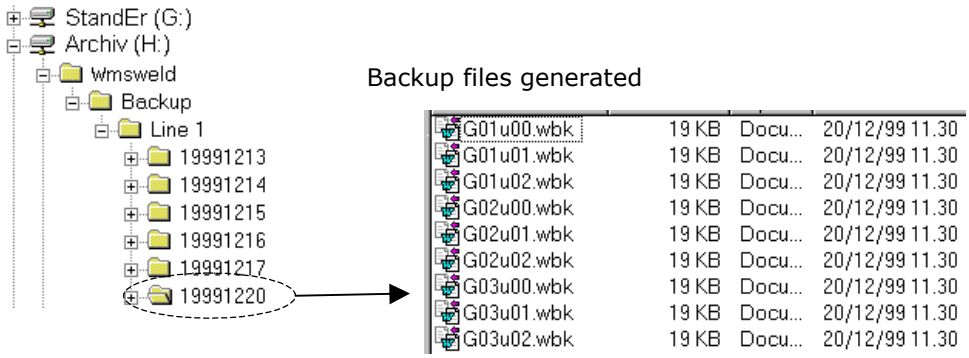
4.2.2 Backup with external configuration (optional)

The backup can be managed through a predefined configuration contained in a file external to WMS.
This external configuration may only be defined through the Configurator programme (optional) and must be enabled in the configuation menu of WMS (see chapter 1.3.3).
When WMS has the external configuration enabled, at the preset time and date it makes a backup of all the devices connected to it, in the path defined with Configurator, automatically creating a subdirectory whose name will be the computer's network user name.
In this subdirectory, for each backup operation WMS will automatically create a further folder, whose name is the date on which the backup is made.
The name is in the format "year/month/day", i.e. if it is made on 20/12/1999, the name of the folder created will be 19991220.
A backup file is stored in this folder for each welding control connected to WMS, the name of the backup files being the standard name in the backup function.

Example of automatic backup:
With the Configurator programme, a daily backup has been programmed, to be made at 11:30 am, from Monday to Friday, (Saturday and Sunday being excluded), to be stored in **H:\Archiv\Wmsweld\Backup**.
Assuming that at the WMS centralizer, with the company user name "Line 1", the external configuration is enabled on Monday 13/12/99 at 8.0 am, at the time of the backup (11:30 of the same day), WMS will access the folder of the network pathway H:\Archiv\Wmsweld\Backup and create a folder "Line 1". In this folder it will create another folder called 19991213 in which it will store the backup files *.wbk of the welding controls connected to the network.



On the days following the backup the directory "Line 1" that identifies WMS already exists, thus when WMS makes the backup it only creates the folder identifying the backup date, so that on the following Monday (20/12/99) at 12.0, there will be the following backup files in folder Line 1: 19991213, 19991214, 19991215, 19991216, 19991217, 19991220 for the respective days.
The figure below shows the tree structure of the folders created by the backup of WMS "Line 1".



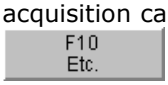
Even if automatic backup is enabled, manual backups may be made in any case, provided that the destination folder for the backup files has a different name.

4.3 Data acquisition (option)

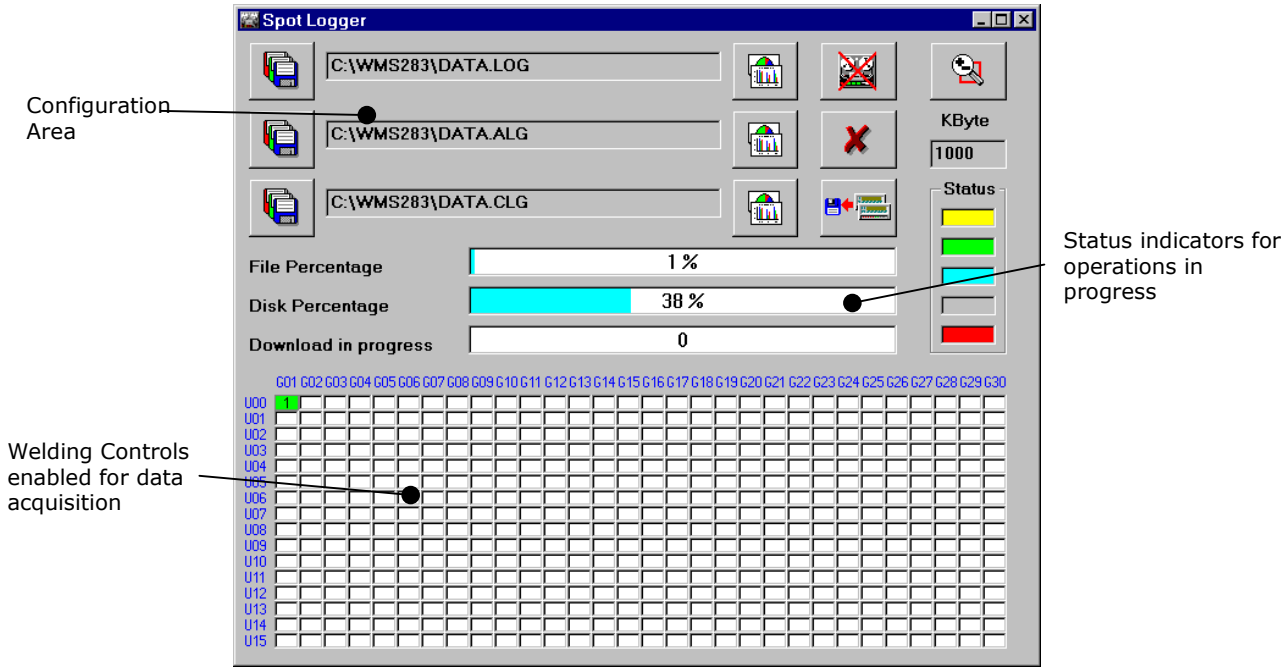
4.3.1 General

The data acquisition function is a tool that enables WMS to collect the Result of each welding, the Alarm History and the Change History from welding controls WELD332 and WELD334m and store them on disk in text format for subsequent analysis. The function is able to download data fully automatically or manually, and, by means of status indicators, to display the progress of these operations. It is also possible to stop the welding process should the welding control memory be full in order to avoid data loss.

Data acquisition can be accessed via the icon

or the function keys: 

plus


Spot Logger
C:\WMS283\DATA.LOG
C:\WMS283\DATA.ALG
C:\WMS283\DATA.CLG
KByte
1000
Status
File Percentage
1 %
Disk Percentage
38 %
Download in progress
0
G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30
U00 U01 U02 U03 U04 U05 U06 U07 U08 U09 U10 U11 U12 U13 U14 U15
Configuration Area
Status indicators for operations in progress
Welding Controls enabled for data acquisition

The top of the window contains the buttons used to configure this function, immediately below these are the indicators of the status of disk, file and the download under way and the STATUS box with the colours relating to the current operative conditions of the welding controls on line. In the lower part is a table in which the networked welding controls are reported together with their data acquisition status.

Description of the process

Data acquisition comprises the following phases:

- Each device (WELD332 or WELD334m) enabled to acquire data sends a request to WMS for *download* when the data accumulated in its memory reach a set percentage of the memory available.
- WMS stores the request and starts the download of data as soon as any other *download* under way has finished.
- The welding control meanwhile continues to acqire data using the reserve memory until WMS makes the *download*. Should this not occur in time (i.e. before the memory is full) the WELD332 or the WELD334m stops welding and acquiring data, depending on whether the option "*Prevent data loss*" is enabled or not.

- Once the download is completed, WMS stores the data in the file specified by the operator until the maximum size specified is reached, at which point a request is made to increase the size or specify a new file.

***NOTE**: The welding control can memorize approx. 270 welding results in the result memory. Since WMS takes about 5 seconds for the downloading operation, in order to avoid any loss of results and/or of welding blocks, we recommend that the maximum frequency of welding for each welding control is not above 54 welds per second divided by the total number of welding controls enabled for data acquisition. Furthermore, when the result acquisition function is activated, we recommend limiting network traffic (for example functions such as Backup, Replace Welding Control and Copy should only be used when data acquisition is not in progress).*

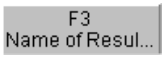
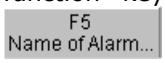
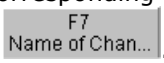
***Warning!** When Data Acquisition is not used we recommend disenabling the function on all welding controls (see paragraph 2.2.2)*

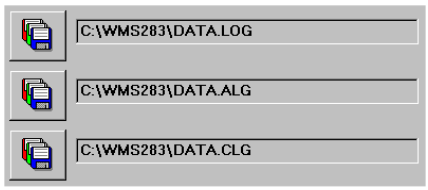
4.3.2 Functional description

To use Data Acquisition, carry out the following operations:

1. Enable the function in the Setup (see paragraph 2.2)

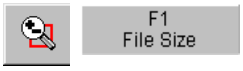
2. Define the files in which data must be stored

To define the name and location of the files click the button or select the function key corresponding to the data to be stored  or  or  . The standard Windows window for file selection will appear. If the file selected already exists a warning message will be displayed and confirmation requested. If you confirm, the data acquired will be placed in the existing file after the existing data. Otherwise, a new file will automatically be created specifying the new name. Once chosen, the file name will be displayed in the box alongside the button.

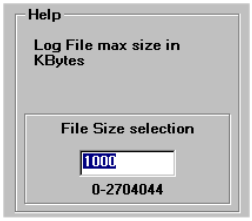


***Warning!** It is not possible to access Data Acquisition if the External Configuration is activated (see paragraph 1.3.3)*

3. Programming maximum file size

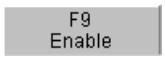


The operator must specify the maximum size that the file may reach, using the buttons illustrated alongside, in order not to swamp the disk on which the data are stored.



On activating one of these buttons the dialogue box shown alongside will appear. Here you may specify the maximum file size in Kbytes. The permitted field of values is shown immediately below the box in which you type the number, and is determined in function of the free space on the destination disk. Once programmed, the maximum size is visualized in the box "Kbyte".

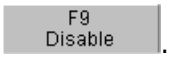
4. Enabling automatic acquisition

When you have defined the files for the data and their maximum size, you can enable automatic data acquisition using or 

In this way, WMS automatically downloads the data to be stored and stores them on diskettte.
In this condition configuarion changes are not permitted.
If the data acquisition window is minimized or acquisition is disabled while one or more downloads from the welding controls are under way, the operations are not influenced by this and acquisition continues normally until it is finished.

Warning! *We recommend you do not exit WMS or Windows while data transfer operations are under way. Otherwise data may be lost. Always ensure that automatic acquisition is disabled and wait until any operations under way have finished.*

5. Disable automatic acquisition

To disable automatic data acquisition, click on the button or press 

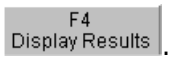
.
If a data download from the welding controls is under way, it is indicated that you must wait until the operation is finished, then press the disable button again and confirm the subsequent request.

6. Manual data acquisition

When you want to perform data acquisition manually, you must first disable automatic acquisition (see above).
Manual acquisition may be done at any time using the buttons illustrated alongside.

7. Data analysis

The files stored by WMS (*.log, *.alg, *.clg) are in text format.
The data fields are separated by the character ";" so that they can be edited by any editor programme, database or spreadsheet.

To select this application, click on the button or press 

.

The data fields are ordered as follows:

Result acquisition (*.log)

- Network address of the welding control
- Number and name of the Group (2 fields)
- Number and name of the Unit (2 fields)
- Number of pieces welded (not used at present)
- Index and name of the welding spot
- Number and name of programme used for welding (2 fields)
- Welding mode used
- Date and time of the welding in question (2 fields)
- Result of the welding (or error code)
- Status of current sensor (enabled/disabled)
- Block enabling – Status of data loss prevention (enabled/disabled)
- Tolerance (lower and upper) permitted for the welding current (2 fields)
- Programmed current for a maximum of 4 pulses (4 fields)
- Current measured for a maximum of 20 pulses

Alarm History (*.alg)

- Network address of the welding control
- Number and name of the Group (2 fields)
- Number and name of the Unit (2 fields)
- Number and name of programme used for welding (2 fields)
- Index and name of the welding spot
- Alarm code and description of alarm (2 fields)
- Date and time of the alarm (2 fields)
- Block enabling

Changes History (*.clg)

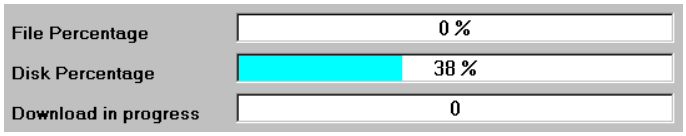
- Network address of the welding control
- Number and name of the Group (2 fields)
- Number and name of the Unit (2 fields)
- Area selected
- Type of access (R = remote, L = local)
- Author of the changes
- Parameter changed
- Grounds for the change
- Previous value of the parameter changed
- Value inserted with the change
- Date and time of the change (2 fields)
- Block enabling

***Warning!**: Never consult the data files while automatic data acquisition is under way or while data is being downloaded from a welding control to WMS. Data may be lost. This is because many applications block the file on which they are working, making it impossible for WMS to write data onto them.*

4.3.3 Information displayed

In the central and lower parts of the window some information relating to the download status are displayed.

Percentage indicators



- **File percentage**: This indicates the current file size as a percentage of the maximum programmed size. When this percentage passes 75% the bar is coloured in red to indicate that the maximum size will soon be reached.
- **Disk percentage**: This indicates the percentage of the disk that the programmed size of the data file occupies. In this case, too, when it passes 75%, the bar turns red to indicate that the disk is almost full.
- **Download in progress**: This indicates the number of downloads in progress. By download in progress is meant a welding control with which data transfer is under way. We recommend disenabling data acquisition only when the number indicated is 0.

Table of welding controls connected
This table is useful to know the data acquisition status of each of the welding controls connected to the network.

The colours indicate the status:

- **Grey**: The welding control is not enabled for data acquisition
- **Green**: The welding control is enabled for data acquisition but is not enabled for prevention of data loss. This means that if WMS does not download the data from the device in time (before its memory is full) the subsequent data will be lost.
- **Yellow**: The welding control is enabled for data acquisition and is enabled for prevention of data loss. This means that if WMS does not download the data from the device in time (before its memory is full) the welding control will stop welding until the data are transferred and/or acquisition or prevention of data loss are disabled
- **Red**: The welding control is enabled for data acquisition and has reached the maximum number of data that can be stored (memory full)
- **Blue**: The welding control is the last device from which WMS has transferred data

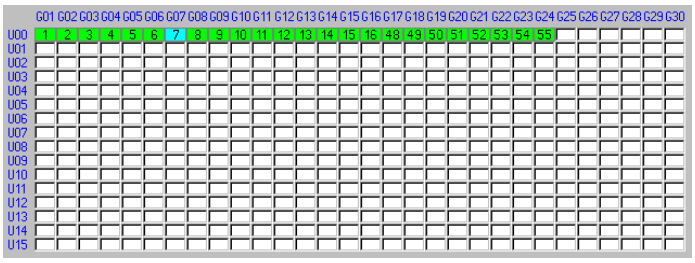


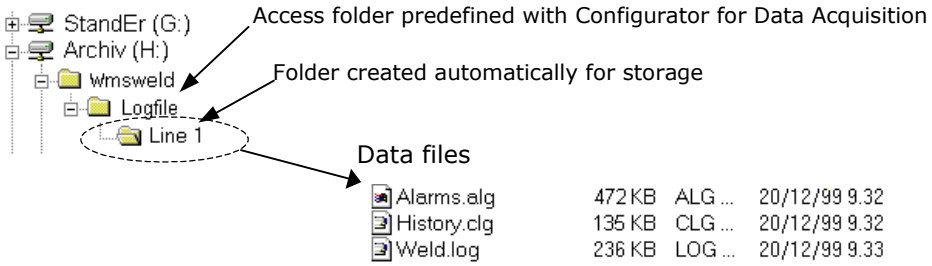
Table of Welding Controls

4.3.4 Data acquisition with external configuration (optional)

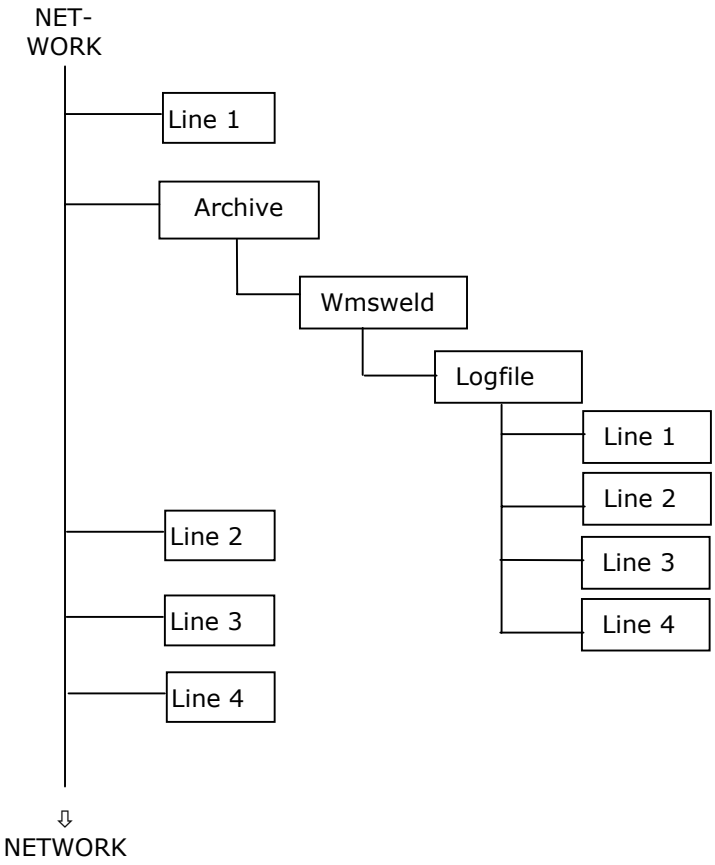
Data acquisition can be managed through a predefined configuration contained in a file external to WMS.
This external configuration can only be defined through the Configurator programme (optional) and must be enabled in the WMS configuration menu (see chapiter 1.3.3).
When Wms has the external configuration enabled, it downloads data from all devices connected to it, automatically creating a subfolder in the pathway defined with Configurator that will have as its name the WMS computer's network user name.
In this subfolder, WMS stores the files of the data acquired with the preset extensions.

Warning!: *If external configuration is enabled, data acquisition must in any case also be enabled in the Setup function*

Example of data acquisition:
An external configuration file has been created (arc.cfg) with the Configurator programme, in which the pathway **H:\Archiv\Wmsweld\Logfile** has been defined for Data Acquisition files destination.
WMS has been enabled for the external configuration recorded in the file arc.cfg, in the computer with user name "Line 1".
During work WMS "Line 1" accesses the folder defined as (H:\Archiv\Wmsweld\Logfile) and creates the folder Line 1. Subsequently, it periodically downloads the data acquired from the welding controls enabled for the function (see next figure).
If the directory "Line 1" already exists due to previous downloads, WMS updates the files present, adding new data after the existing data.


StandEr (G:)
Archiv (H:)
Wmsweld
Logfile
Line 1
Access folder predefined with Configurator for Data Acquisition
Folder created automatically for storage
Data files
Alarms.alg 472 KB ALG ... 20/12/99 9.32
History.clg 135 KB CLG ... 20/12/99 9.32
Weld.log 236 KB LOG ... 20/12/99 9.33

Any other WMS present in the network, with different user names, will perform the same sequence of operations.
The figure below illustrates an example of the data archive structure in which there is one archive PC and 4 PCs with WMS named Line 1, Line 2, Line 3, Line 4 enabled for Data Acquisition, as in the previous example.



4.3.5 Operative configuration

The file WMSCONF.INI located in the WMS installation directory, in the section [W_LOG.Configuration], contains the operative parameters that reflect the setup inserted by the operator (name and size of file, external application, etc.) and also some parameters that determine the mode in which data acquisition will be performed. These parameters can be changed by the operator for particular requirements.
In all other cases we recommend not making any changes.

Parameter	***Standard values***	***Permitted values***	***Description***
LogPercentage	50%	10 - 90%	Percentage use of welding control's memory on reaching which WMS downloads the data. If this percentage is reduced, the data will be downloaded more frequently, whereas if it is increased the risk of swamping the memory, with consequent loss of data or block of welding, is increased.
LogTimerTick	1000	500 – 5000	Interval in mS between data downloading from the various welding controls. If this value is reduced, the network traffic is increased, whereas if it is increased, there is a risk of swamping the memory with consequent loss of data or block of welding.

4.4 Spot reference

This function relates to a new command interchange modality among automation systems (robot, PLC…) and the welding controls; the commands in question are those relating to the selection of programmes containing time/current or other parameters to be assigned to the various spots that must be welded.

These spots are identified on drawings with a specific code, typical of each customer and/or project.

With the traditional methods, these welding programmes are selected by binary codes or bcd; but this type of interaction makes it difficult for the operator, starting from drawings of objects, to later identify the welding spots with the programmes that have executed them.

In practice, this information is lost on the welding controls.

With *Spot Reference*, on the contrary, it becomes possible to use the reference present on the project drawings: the spot code on the drawing, or "Spot Name", is stored in the welding control and used both in selecting parameters and in the various reports.

The "Spot Name" may contain up to 32 characters. This means that its transmission might slow production processes.

An information interchange mechanism has therefore been established through a very short "index" of 16 bits, from which the name of this function derives. In automation systems, robots, etc. a table of associations between "Spot Name" and "Spot Index" is generated; the spot index is that sent to the welding controls.

The function operates on the welding control through a corresponding transcoding table, which defines univocal associations between "spot index" values received and the number identifying the welding programme.
An alphanumeric string known as the "Spot Name" is associated to each Spot Index value, this name being the same that, on the robot end, activates that index. Thus the information circle is closed.

The table on the welding control contains up to 256 items.

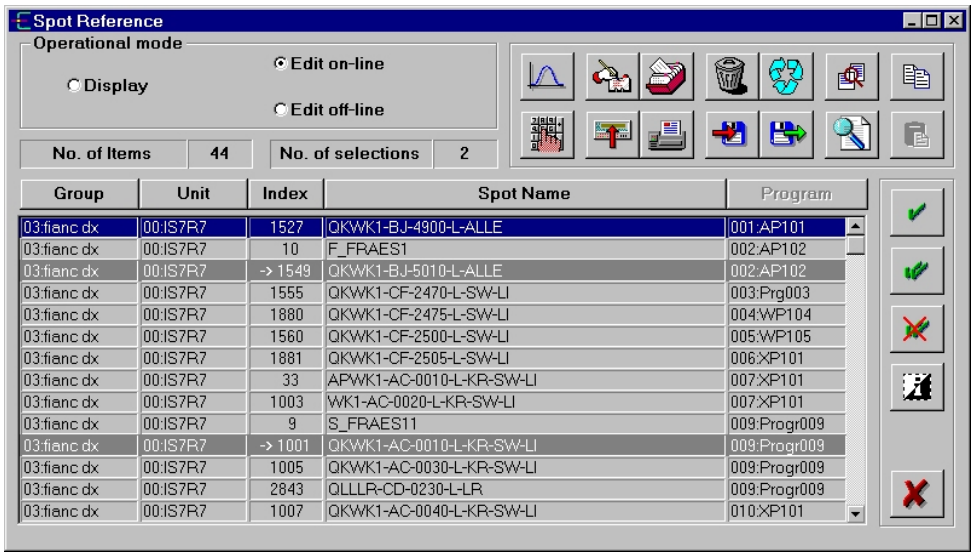
On the WMS end, the Spot Reference operation takes the form of a set of functions governed by an operator interface whose purpose is to manage data pertinent to each device.

The potential of this function is further enhanced by various possibilities to import and export files in “csv” format (MS Excel). This enables data to be exchanged with CAD environments, and facilitates subsequent processing of data relating to quality and production.

The command function of the welding programmes remains in any case available, referred, as previously, directly to the programme number to be used for the spot.

4.4.1 Description of operator interface

By means of the F4 Spot Reference function key or the Spot Ref... icon the dialogue box may be accessed:



The section **Operational mode** offers three possibilities:

Display Enables data contained in the devices present in the local network to be displayed in real time.

Edit on-line Enables the operator to act on the association between spots and welding programs. Only devices present in the local network are involved.

Exit off-line Enables the operator to act on the association between spots and welding programs. Devices present in the local network and those not present are involved.

The table displaying the data is subdivided into five fields:

Group Contains the group number (values from 1 to 30) and the associated name, if any.

Unit Contains the unit number of the welding control within the group (values from 0 to 15) and the associated name, if any.

Index Contains the number identifying the welding spot (values from 1 to 65535). Identical spot indexes are not possible within a single unit.

Spot name Field destined to contain an alphanumeric string (maximum 32 characters), designed to facilitate identification of welding spot by the operator. Identical spot names are not possible within a single unit.

Programme Contains the number and name, if any, of the programme called up to weld the spot via the **Index** field.

The display may be sorted by any one of the fields, by clicking on the button at the top of the column.

The buttons with icons give rapid access to management functions. These functions, except for the first one, are only available during editing sessions.

Set data display filter. This function is always available. It opens a dialogue box through which it is possible to determine criteria to select items of the different spot references for display.

Define new item. Enables a new welding spots to be introduced.

Edit highlighted item. Enables changes to be made to data relating to current item.

Eliminate selected items. Eliminates all items selected in the table. The system asks for confirmation of deletion.

Verify congruence. Checks congruence between spot reference data for each device, enabling the operator to correct any unacceptable data.

Comparison between current Spot Reference and Spot Reference under editing. Displays in table form the list of differences between the spot references of the devices and the respective data under editing.

Copy selected items to notes. Makes a copy in the notes of the items selected in the table.

Recall programme. Recalls the editing function for the programme associated to the item highlighted in the table. This button is only enabled when the programme is present in the device memory.

Save on unit. This function is only available during on-line editing sessions. It enables data in the memory of the respective devices present in the local network to be saved.

Print. Prints the data relating to devices determined through the display filter.

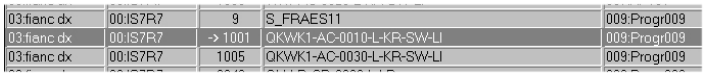
Save on disk. Activates the data saving function on the mass memory (floppy disk, hard disk or other).

Load from disk. Activates the function of loading data from the mass memory of previously saved data.

Open record file. Enables immediate access to the log file to display historical events of the WMS.

Paste items stored in notes. Pastes the content of the notes in the spot reference of a device; it subsequently asks which device.

Select/Deselect highlighted item. This is a bistable button. It changes the selection status of the item highlighted in the table.



03:fianc dx	00:IS7R7	9	S_FRAES11	009:Progr009
03:fianc dx	00:IS7R7	-> 1001	QKWK1-AC-0010-L-KR-SW-LI	009:Progr009
03:fianc dx	00:IS7R7	1005	QKWK1-AC-0030-L-KR-SW-LI	009:Progr009

The selection can be recognised by the arrow alongside it in the Index field.

Select all items present on the list. All items contained in the table are selected.

Remove all selections. This button removes all selections present in the table.

Invert selection status. This button inverts the selection status of all items present in the table.

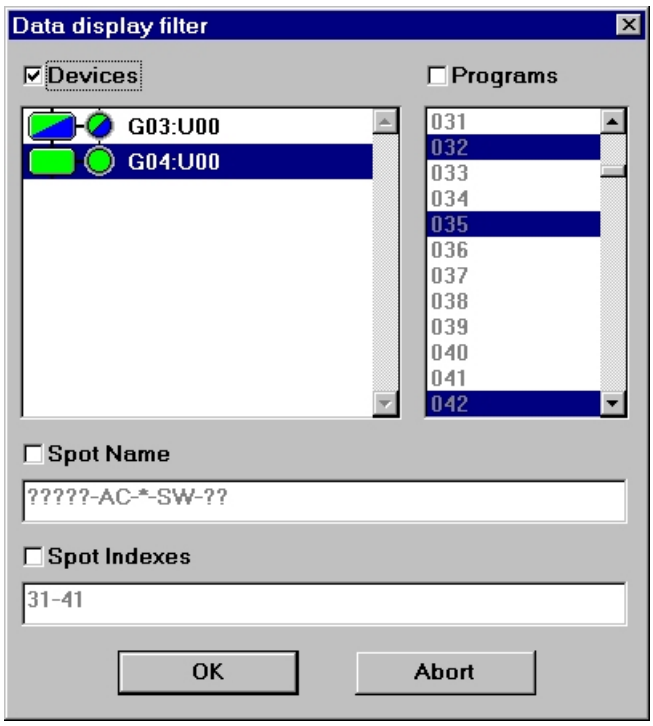
Exit. Enables the spot reference function to be closed. If changes have been made and not saved, the programme will ask the operator to confirm the operation.

4.4.2 Data display filter

This function is activated by clicking on the button or by pressing the

function key.

The dialogue box enables the selection criteria to be determined for the items that are displayed, in terms of device, programme, spot name and spot index; they are applied with "conjunction" type modality (AND).



Devices When this box is not selected (option not activated) the spot references of all devices present in the network are displayed (Display; Edit on-line) or those of all configured devices (Edit off-line). When this box is selected (option activated) the spot references are only displayed for the devices selected.

Programs When this box is not selected (option not activated) all items are displayed. When the box is selected (option activated) only those items that refer to the programs selected are displayed.

Spot name When this box is not selected (option not activated) all items are displayed. When the box is selected (option activated) only those items whose spot names meet the filter specifications defined by the string below are displayed. The syntax is based on the use of the special characters '?' and '*' in concomitance with characters which may be contained in the spot name. The question mark admits any character present in the spot name at the corresponding position. The asterisk may appear at most once in the string and admits the spot names of any concatenation of characters at the corresponding position. Every other character admits items whose spot name contains the same character in the same position.

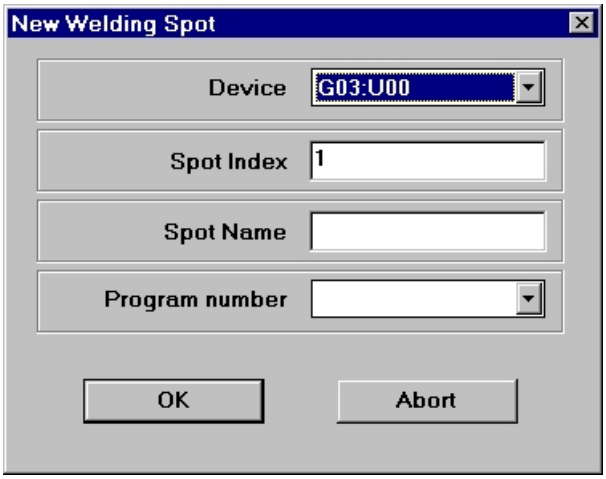
EXAMPLE: by specifying "?????-AC-*-SW-??" all items will be displayed whose spot names contain the string "-AC-" starting from the sixth character, and the string "-SW-" at the beginning of the last six characters.

Spot indexes

When this box is not selected (option not activated) all items are displayed (all welding spots). When this box is selected (option activated) a list of spot indexes to be displayed must be defined. The syntax provides for the definition both of individual spot indexes and of intervals of spot indexes, each separated by a comma from the subsequent one. Intervals of spot indexes must be expressed as the lower limit separated by a hyphen from the upper limit. EXAMPLE: with 1, 37–48,1027 all items with spot index 1, all items with spot index between 37 and 48 (inclusive) as well as all items with spot index 1027, will be displayed.

4.4.3 New Welding Spot

This function may be accessed by clicking on the button or by pressing the F2 Insert function key.



Device — Pull-down menu enabling selection of the device (group and unit) to which the new welding spot will be attributed.

Spot index — Numerical field to enter the identification number of the new welding spot (values between 1 and 65535). Duplicate values cannot exist within the same device.

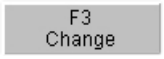
Spot name — Alphanumeric field (maximum 32 characters) to enter the name to be given to the new welding spot. Duplicate names cannot exist within the same device.

Programme number — Pull-down menu enabling selection of the programme used by the device to produce the welding spot in case of external request. The device generates an alarm at execution if the programme is absent. For programming please see Chapter 2 of the WMS manual.

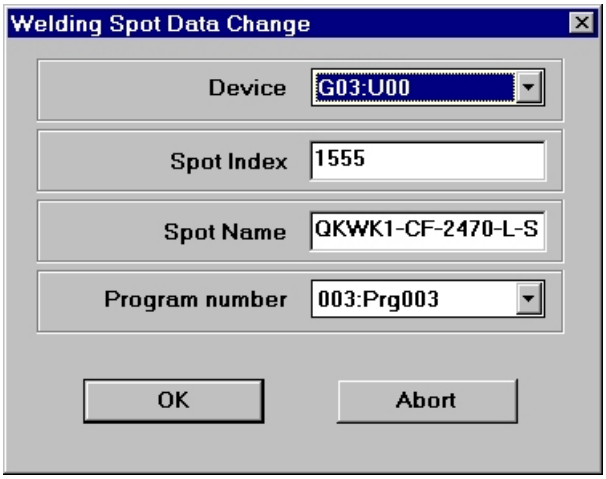
NOTES:

- *In the dialogue box, one device and one spot index are initially proposed; the spot index is the lowest value available for that device.*
- *If the spot index entered is already present in the spot reference, the corresponding existing item will be edited. In that case the operator is asked to confirm the operation explicitly.*

4.4.4 Welding spot data change

This function may be called up by clicking on the button, or by pressing the 

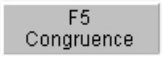
function key, or by double-clicking on the item to be edited.



Please see paragraph 4.4.3 for a description of the fields in the dialogue box.

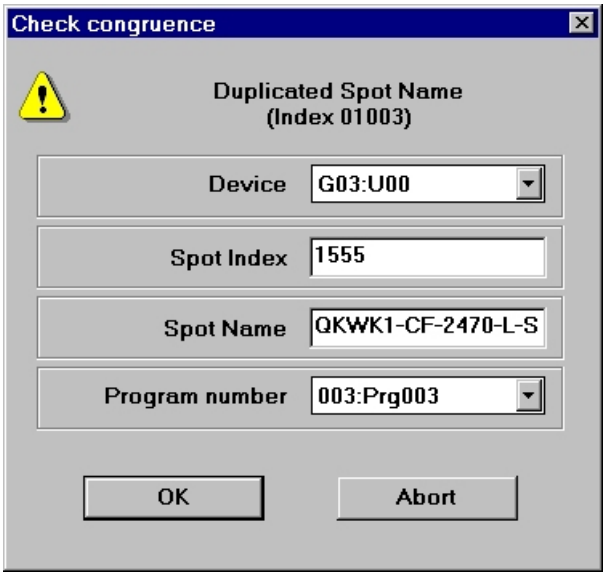
In the "**Spot Index**" field a new item may be created. If a value that already exists is entered, an item different to the current item will be edited. In both cases, the operator is asked to explicitly confirm the operation.

4.4.5 Check congruence

This function is activated by clicking on the button or by pressing the 

function key.

Each time incongruence is found, a dialogue box with a description of the problem is displayed:



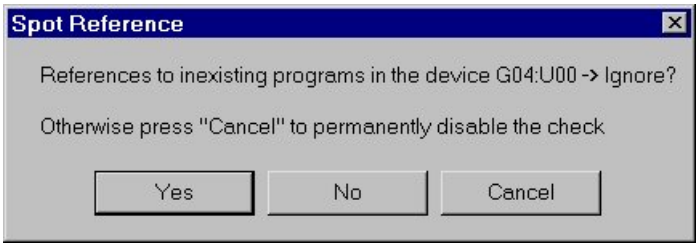
In this window the cursor is automatically positioned in the field in which the discrepancy has been found. The operator may make the correction or may decide to abort the check.

For a description of the fields in the dialogue box, please see paragraph 4.4.3

This function makes the following checks:

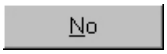
- It checks acceptability of the spot name: only printable characters are accepted (ASCII code from 20 to 7E hexadecimal).
- It checks acceptability of the programme number. Acceptable values: from one to the maximum permitted by the device (typically 255).
- It checks that the spot name is unique.
- It checks whether the welding programme associated to the spot index exists in the device. This check can be disabled.

When the "check programme existence" function is enabled and one or more spot references refer to programs that are not defined, a dialogue box of this type is displayed:



By selecting the

button, the negative result of the check of programme existence will be ignored for the purposes of checking congruence.

By selecting the 

button, the entire check of congruence will fail due to the negative result of the check of programme existence.

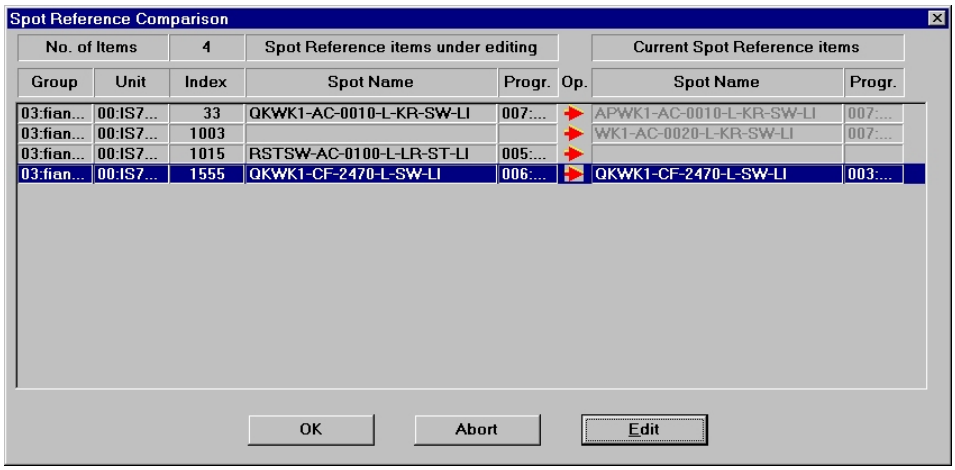
By selecting the

button, the check of programme existence will be permanently disabled. To re-enable it, it will be necessary to close and reopen ***Spot Reference***.

4.4.6 Comparison between current Spot Reference and that under editing

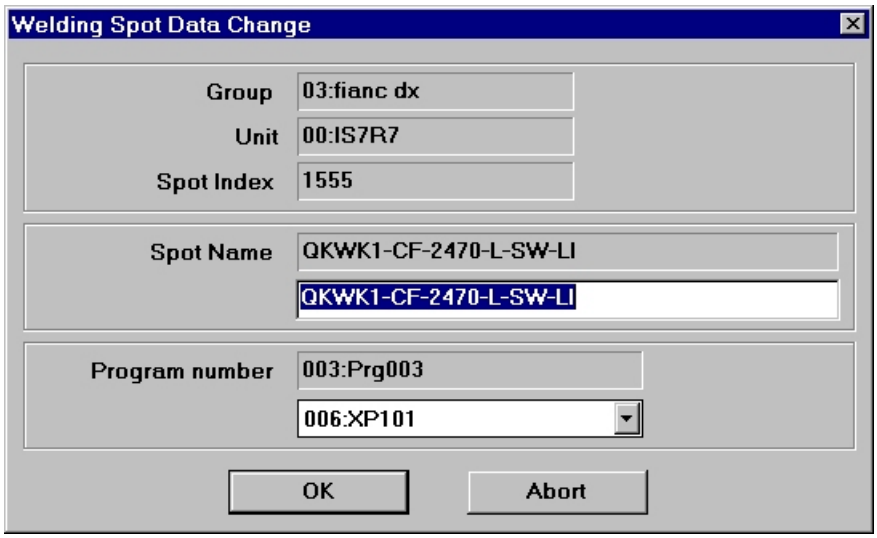
By clicking on the button, a comparison is requested between the current status of spot reference items in the devices present in the network, and the status of the spot reference under editing by the operator.

If differences emerge, the following dialogue box is displayed, listing in table form the items that differ in the two situations, ordered by group, unit and, lastly, by index.



In the column "***Spot Reference items under editing***" the items corresponding to the spot reference undergoing editing by the operator are displayed. In the column "**Current *Spot Reference items***" the items corresponding to the spot reference items stored in the device memory, at the time of the operator's request for comparison, are displayed.
The symbol between the two columns indicates the potential update of the item memorised in the device (in grey) that will be replaced by that edited by the operator (in black). If the symbol is not present, this indicates the potential maintenance of the item stored in the device memory and is displayed in black. The lines in which the fields of the column "**Current *Spot Reference items***" are empty indicate new items inserted by the operator. The lines in which the fields of the column "***Spot Reference under editing***" are empty are originated by cancellation of items by the operator. The Spot Reference Comparison window is initialised so as to support the potential updating of all items stored in the device memory with the corresponding items edited by the operator. In other words, each line displays the symbol and all items in the right-hand column (**Current *Spot Reference items***) appear in grey. For each line the operator may decide differently, double clicking on the line itself. This operation inverts the situation, and this is displayed by the disappearance or reappearance of the symbol.

When a line of the table is highlighted, the Edit button is enabled. On clicking this button, the following dialogue box is displayed:



The operator may change both the **Spot Name** and the **Programme Number**.

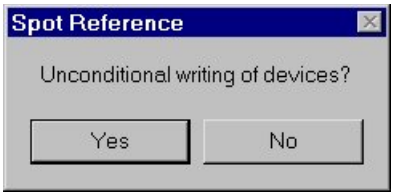
NOTE: *The* Abort *button in the* ***Spot Reference Comparison*** *dialogue box, from which this box is accessed, does not cancel changes confirmed at this level.*

4.4.7 Save on Unit

This function, which is only available in on-line editing sessions, is activated by clicking the button or by pressing the

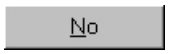
function key.

This message appears:



By clicking the

button, the edited spot reference items are unconditionally stored in the respective device memories.

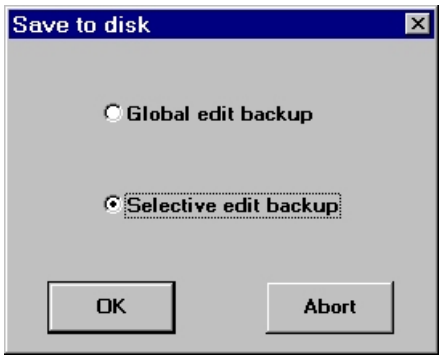
By clicking the 

button, storage in each device memory is conditional on the fact that the version of the current spot reference, to be overwritten, coincides with that on which the changes have been made. This option enables loss of competing changes to be avoided (see paragraph 4.4.10).

4.4.8 Save to disk

By clicking on the button or pressing the

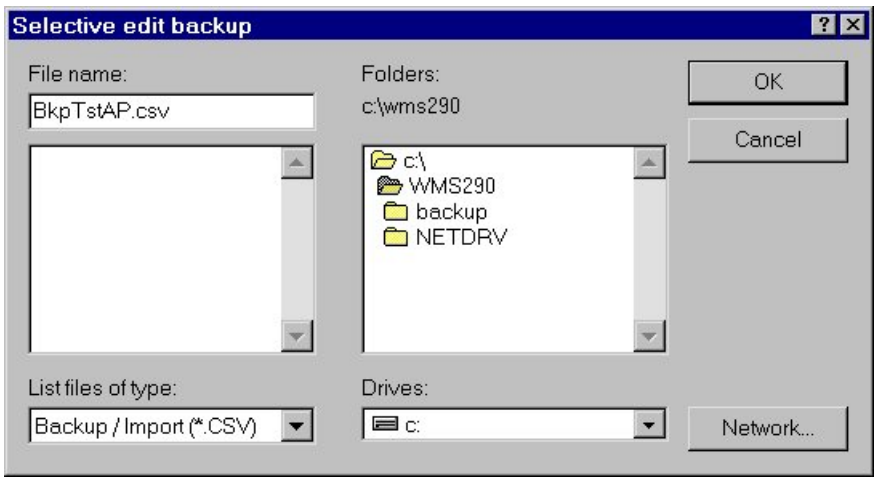
function key, the following dialogue box is called up:



The command **Global edit backup** saves the spot reference items under editing, involving all devices configured.
The command **Selective edit backup** saves the spot reference items under editing, involving all devices selected in the display filter.

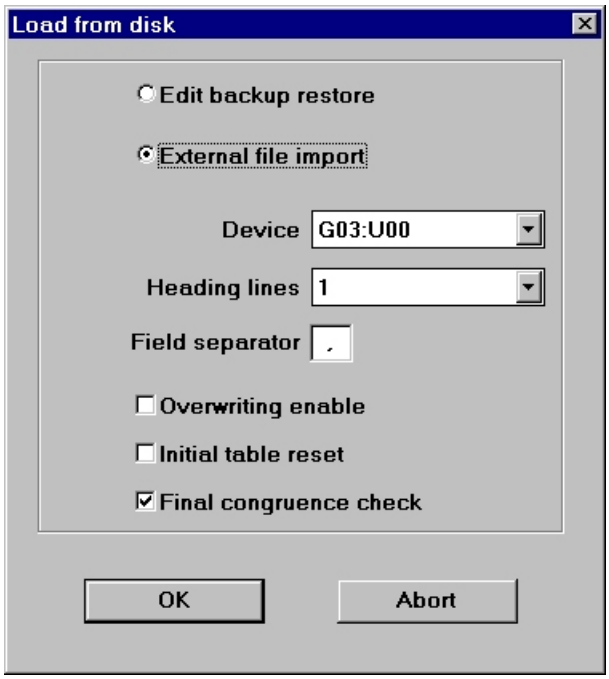
By clicking on

the dialogue box is activated that enables storage path and file name to be defined.



4.4.9 Load from disk

By clicking on the button or pressing the F9 Load_File function key, the following dialogue box is called up:



Two mutually exclusive commands can be selected from this window. The first, **Edit backup restore**, enables the last data saved on file to be restored. The second, **External file import**, enables spot reference data to be imported from files external to WMS.

Device	Pull-down menu to select the device to which the file to be imported relates (field disabled if Edit backup restore is enabled, since the information is, by definition, contained in the file).
Heading lines	Pull-down menu to select the number of heading lines (from 0 to 10) present in the file to be loaded, lines that must therefore be ignored.
Field separator	Box to set the separator character between fields of items imported or restored, whenever the character proposed (in the international Windows settings as "list separator") does not correspond to that used by the file to be loaded.
Overwriting enable	When this box is selected, an item being imported or restored will replace an existing item with the identical spot index. If more than one item in the file has the identical index, the last one prevails. When this box is not selected, on the contrary, the pre-existing item prevails or, no such item being present, the first item in the import or in the restoration prevails.

Initial table reset	If this box is selected, the spot reference items for the devices involved are reset in advance.
Final congruence check	With this box selected, at the end of file loading a check of congruence is activated on the spot references being edited, relating to the devices involved.

By clicking on

the dialogue box that enables selection of the path and file name for loading is activated (see paragraph 4.4.8).

Notes on the file to be imported:

- it must be a pure text file (file name with typical extension "csv").
- each line of the file must contain the data for one spot reference item.
- The fields must be ordered by the following criterion: <spot index> <separator> <spot name> <separator> <programme number> <CR>. the last separator and the programme number are optional.
- the heading of the file to be imported may have any contents and may be between 0 and 10 lines.
- each file to be imported refers to a single device.

4.4.10 Competitive changes

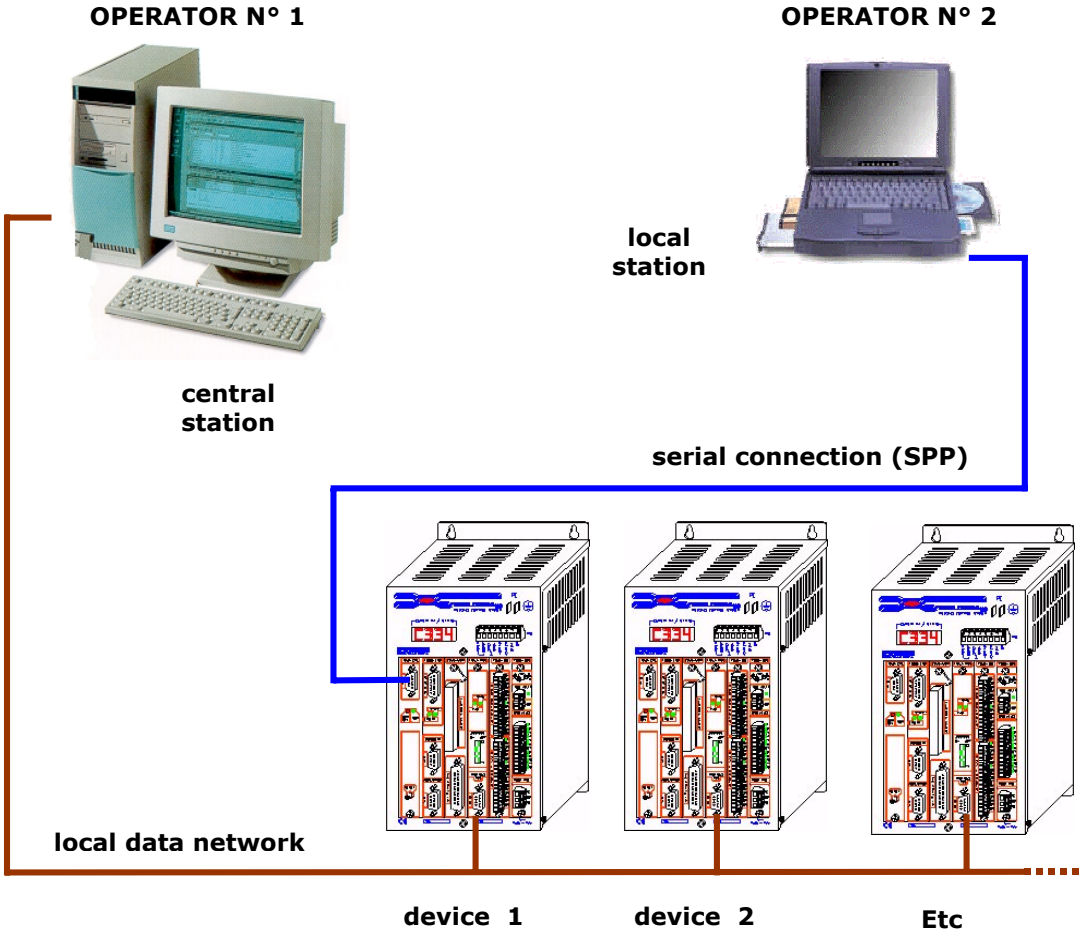
Each welding control device is fitted with a dual-type connection to the field (see figure):

1. **local data network** for the connection of all devices belonging to a system; it may be of the WMSnet or WMSnet Plus type (GF WELDING proprietary networks), PROFIBUS or Ethernet TCP/IP;
2. ***serial*** connection of the point-to-point type (SPP).

Access through the two types of connections comes about independently; it follows that changes may be made by two operators in competition.

In particular, a local operator connected serially may activate an editing session at the same time as the central operator connected to the network does so. Thus, when saving on the device it is advantageous to get into the habit of selecting the option **conditional writing** (see paragraph 4.4.7) in order to avoid loss of changes. Indeed, when operating in this modality, in the presence of changes in competition concerning a specific device, writing them is avoided beforehand. Indeed, an error signal (error [19] from the device) enables the operator easily to disentangle the situation using the function ***Spot Reference*** **Comparison** (see paragraph 4.4.6).

NOTE*: The introduction of a new item in competition by one operator appears to the other, after saving on the device, as his/her own cancellation (empty fields in the corresponding item under editing); vice versa, cancellation of an item in competition by one operator appears to the other, after saving on the device, as his/her own addition (empty fields in the corresponding current item).*



4.5 Creating a Traceout.txt file

On some welding automatisms it is necessary to communicate (from WMS to the other device) the data relating to the last welding programme performed by a Welding Control.
WMS automatically generates (in the WMS installation directory) a file in text format named *Traceout.txt* containing the data relating to the last welding performed; this file is updated at each new welding.

Example: Below is the contents of the file *Traceout.txt* containing the data of a hypothetical welding.

Welding Analysis	
01:GROUP 04	*Group:*
00:FASE 332	*Unit:*
Mon-29-Mar-1999 10:15	*Date & Time of Welding*
Normal	*Welding Mode*
10	*Selected spot index*
F_FRAES1	*Selected spot name*
7:PAVIM3	*Programme Selected*
--	*Stepper Used*
0	*Sample Weldings Done*
2	*Number of Dressings*
Disabled	*Welding Cable Counter*
4	*% Current Increment*
0	*% Pressure Increment*
Enabled	*Current Sensor*
0.0	*Output Pressure val.1*
0.0	*Output Pressure val.2*
0.0	*Input Pressure*
0.0	*Electrode Voltage*
0.93	*Cosphi Detected*
0.0 kA	*Estimated Minimum Current*
0.0 kA	*Estimated Maximum Current*
0:OK	*Welding Result*
[1]	*Pulse no.*
50 %	*Programmed Current*
50 %	*Set Current*
9.4	*Current Measured*
10	*Programmed Welding Cycles*
10	*Actual Welding Cycles*

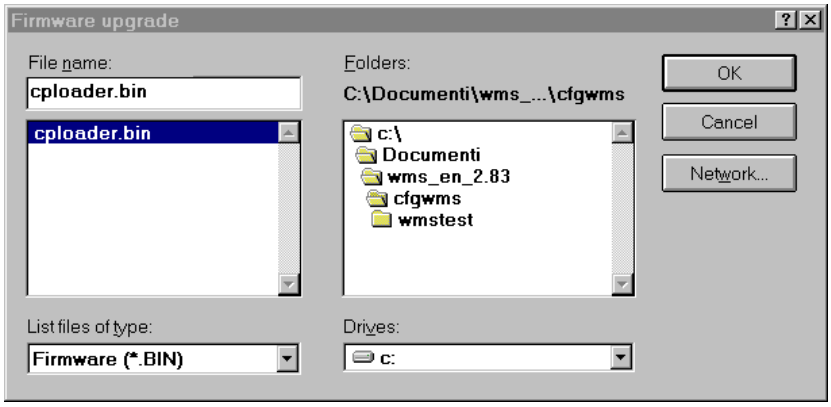
4.6 *Updating the Welding Control Firmware*

This function enables the welding control Firmware to be updated directly from WMS.
To do this the user must possess the Upgrade file, to be loaded on the welding control.
This file has the extension *.BIN and is provided by GF WELDING in the correct format for use.
The file contains all data necessary for the correct configuration of the welding control and before loading the firmware you must select the options desired.
The file must be stored on a floppy disk or on the hard disk, from where it can be uploaded to the welding control.

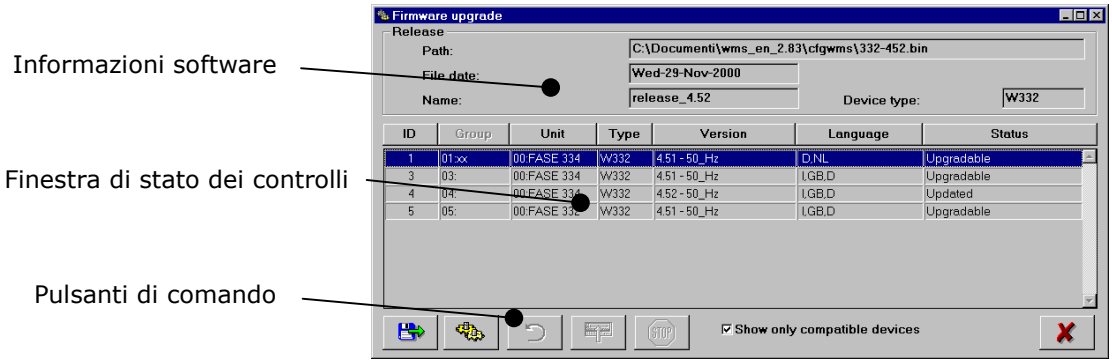
The Upgrade menu may be opened with the function keys F10 Etc. plus F8 Firmware Upg. or the icon Firmware ... .

4.6.1 Selecting the file and opening the upgrade menu

The menu opens with the request for file *.bin



Access the driver and open the directory in which the Upgrade file is contained, select it and confirm with **OK**.
The Upgrade window has three different areas: one for information about the software, one which lists status of welding controls and one with buttons that can be activated depending on the level of operations being performed.



4.6.2 Buttons

The buttons have the following functions:

Enables selection of the upgrade file

Opens the configuration window

Restores a configuration after changes

Starts the upgrade operation

Suspends the upgrade operation

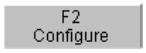
Closes the upgrade function window

4.6.3 Configuration

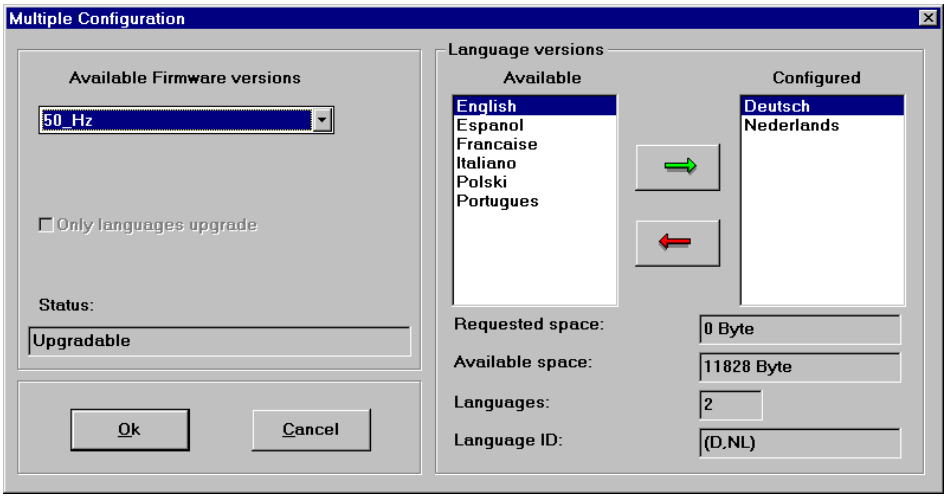
If the upgrade firmware has been defined, upgrade configuration follows.
Configuration may be done in two ways:

- for each individual welding control, selecting the one desired and opening the configuration menu,
- for a group of welding controls, selecting one and enabling the box:

  only welding controls compatible with that selected will be displayed, in this way the upgrading will be done for all devices displayed.

Open the configuration menu with 

or .

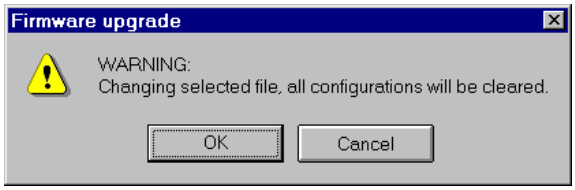


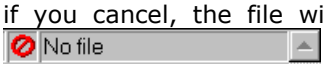
The number of languages that can be loaded depends on the space available on the welding control (indicated in the box). If this space is limited, further languages cannot be loaded.

The two buttons and enable the languages selected to be loaded or unloaded.

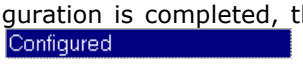
The lower boxes indicate: the memory space occupied by the language selected, the free memory space in the welding control, the number of languages loaded and the acronym of the respective nationalities. These acronyms are then displayed in the welding control status list.
In the "versions" box, the operational characteristics available in the firmware are selected, for example: 60Hz, 50Hz, MF (mean frequency).
These characteristics depend on the upgrade file provided by GF WELDING and may vary from user to user.

If you want to change the file to be loaded, click on the button , a warning message will appear:

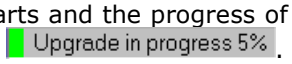


- by confirming, you will access the file selection menu to choose another one,
- if you cancel, the file will be cancelled in the status list, indicated by 

4.6.4 Loading the Firmware

Once configuration is completed, the window listing the devices will bear the indication 

If you want to return configuration to the status prior to the changes, simply select the device desired and click on the button .

To start loading the Firmware click on the button .
The procedure starts and the progress of the upgrading process is displayed in the list of devices 

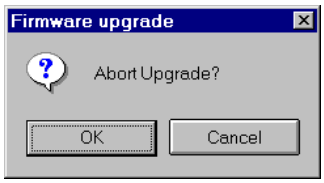
.

When the upgrading procedure is completed, the status bar of the device indicates the condition

.

4.6.5 Interrupting the session

The process can be interrupted at any time by clicking on the button , in this case confirmation is requested.



If the session is interrupted, the Firmware has only been partially loaded onto the welding control, and it must be reinstated (see paragraph 4.6.7).

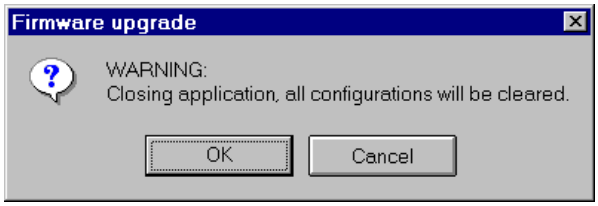
Warning! *If the welding control is switched off after interrupting an upgrade session, it will not be possible to load the firmware via WMS, but will be necessary to do so locally on the device, using a Ram Card.*

4.6.6 Communications errors

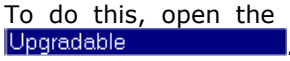
If communications errors occur during an upgrade session, the process will be interrupted and the words

will appear in the status field.

In this situation you must close the menu and confirm with "**OK**" at the warning:



4.6.7 Reinstating Firmware

In the case of a block or an interruption of the firmware upgrade session the session may be reinstated.
To do this, open the upgrade menu and select the devices indicated with 

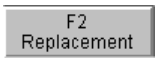
.

Configure the upgrade and start reinstatement by clicking on the button

The session will start again from where it was interrupted.
If the device cannot be selected (light grey) it will not be possible to upgrade via WMS, but will be neccessary to do so locally via a Ram Card.

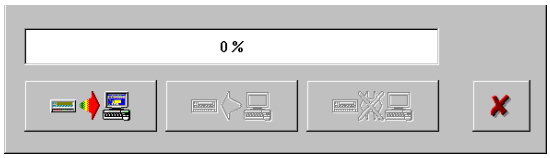
4.7 Saving data for replacement of welding control

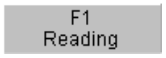
This menu allows all upgraded data relating to a welding control to be downloaded into the backup memory and then loaded onto the new device after the replacement has been made.

Using 

or the icon

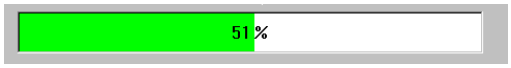
you can open the "Repacement" menu.



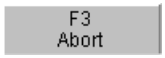


Having selected the device to be replaced, enable data transfer from the welding control to WMS.

During data transfer the status bar displays progress in green.



***NOTE*:** *During transfer, other functions of the centralizer may be used.*

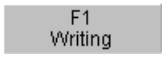


Data transfer may be stopped by activating F3.

Confirmation will be requested; if you want to interrupt click on "YES", otherwise click on "NO" and the transfer will continue.

When the transfer is completed, the command for data transfer onto the welding control is enabled and the status bar indicates 100%.

***Warning!**: While waiting for the replacement to be completed, you may use other functions, but you must not close the window of this function otherwise the data from the control will be lost.*



With F1 you then start loading the data onto the replacement welding control. The status bar indicates progress of this transfer in red.

When the value reaches 100% the transfer is complete, and you may close the function.